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Volume 4 Number 17

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August 20, 1985

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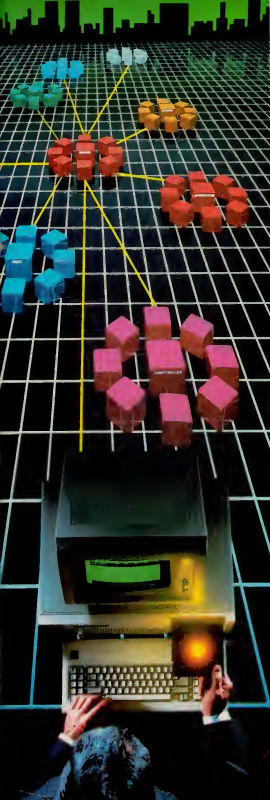
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CIRCLE 226 ON READER SERVICE CARD

PC MAGAZINE • AUGUST 20, 1985

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COVER STORY/FEATURES

Word Processing: The Latest Word 110

Phil Wiswell/Word processing is the most popular PC application. With so many different packages on the market, how can you decide among them? *PC Magazine's* team of expert reviewers takes a feature-by-feature look at 18 of the most

popular word processors. They subject them to a series of rigorous tests and score them in easy-reference comparative charts of features and benchmark test results. They also provide in-depth analyses, telling you what you need to know in order to select the right one for you.



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An insider's guide to the making of *PC Magazine*.

PC NEWS 33

Nine pages of up-to-the-minute news, product mini-reviews, interviews, short features, and commentary.

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Bill Machrone/Word processing is one of the most popular and rapidly changing applications in the world of personal computing. How can users keep up with the new technology?

LETTERS TO PC 63

Readers from around the world share their insights, comments, and questions.

THE NORTON CHRONICLES

Software Makes the PC 81

Peter Norton/Norton tells all. Revealing the names of some of his favorite software, *PC's* PC sage helps you put together Ye Perfekt PC System.

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The Gigabyte Age 95

Ron Jeffries/In the first appearance of this regular column, the author explores new frontiers of mass storage for the PC.

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The Republic of Technology 105

Stan Augarten/Another brand new regular column. On the menu: digital dining at a popular Palo Alto restaurant.



PROGRAMMING

End Big Blue's

Backup Blues ... 197

John Dickinson/Hard disk backup can be so tedious and unnerving that it invites neglect and consequent disaster. BAC.COM can save you time and tension, making it less likely that you will forego this all-important task.



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Lexical Electronic Filing 136

John Dickinson/Electronic file maintenance also proves useful in searching large external databases.

3-D Reconstruction: Seeing Beyond the Surface 170

Evan K. Fram, M.D./3-D reconstruction on the PC is another way to display data from CAT scans and has many potential applications.



A Footnote to Word Processing 176

Dara Pearlman/These three packages combine the convenience of "what-you-see-is-what-you-get" editing with advanced handling of complex, laborious footnoting and index generation.

Gateway Software to the Information Stars 181

Mick O'Leary/Are you tired of wasting time and money on the complicated user interfaces of large database services? These on-line search-assistance packages automate the busywork, such as log-in procedures, query preparation, and downloading, letting you focus on the actual research.

SPREADSHEET CLINIC 207

Jared Taylor/Users pass along the fruits of their spreadsheet experience, including valuable 1-2-3 macros.

POWER USER 211

John Dickinson/Helpful hints for using hardware and software more productively, from the readers of PC. This issue focuses on advice for WordStar users.

USER-TO-USER 219

Paul Somerson/Readers share their tips and short programs, and the editor adds some gems of his own.

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AT Multifunction Boards: The Fast Five 146

Winn L. Rosch/PC Magazine rounds up five new multifunction cards that can give your AT memory in the megabyte range.

Good Is Not Good Enough 165

Jon Pepper/The Visual Commuter and the Datavue 25 enter the laptop market, promising quality performance but delivering few exciting features to set them apart from the crowd.

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One Small Plus for CPAs 156

Michael A. Yesko and G. William Dauphinais/Designed to operate in the 1-2-3 environment, CPA+ offers small businesses a practical accounting alternative that falls somewhere in between the basic spreadsheet and the conventional accounting package.



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Frank J. Derfler, Jr./With LANLink and EasyLAN, you can have local area networking at a lower price by using the RS-232C serial port on your PC.

NEW ON THE MARKET 226

David Obregón/Five pages of new product announcements of hardware, software, and accessories for your PC. Highlights of this issue: multifunction software for sales people, a laser printer from CDS, and database management system software from reQuest.

PC TUTOR 236

Mark Zachmann/PC Magazine answers readers' questions. In this issue: upgrading the PC-4, solving unscheduled interrupts, silencing a squeaky monitor, learning BIOS initialization procedures and more.

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Cover Photograph: Guy Powers

Calculator and magnifying glass courtesy of ADHOC N.Y.C.

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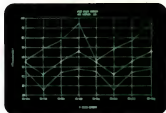


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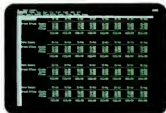
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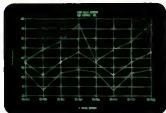


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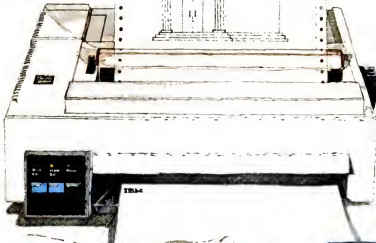
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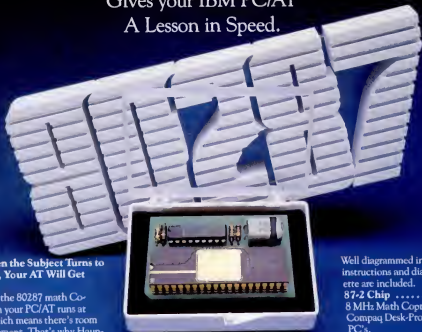
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CIRCLE 103 ON READER SERVICE CARD

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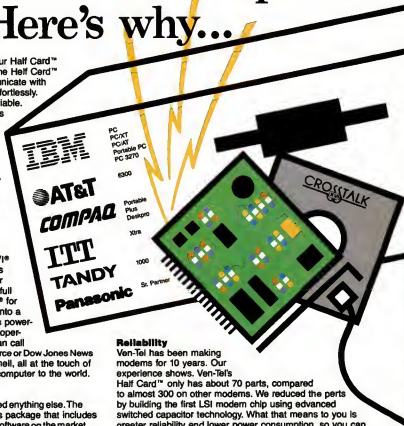
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What's Inside

It takes a dedicated person to be a project manager. Without one, PC would never be able to bring you such large-scale projects as this issue's comprehensive investigation of the best word processing software.

If you're a regular reader of this column, you may have, at one time or another, been puzzled by the term "project manager," which identifies the person who oversees the progress on a particular editorial project. It may be especially confusing since the title is rarely awarded to the same person.

Those of you who have participated in large projects know how necessary it is to put one person in charge. In the case of *PC Magazine* review projects, a single glitch can wreak havoc among the project participants and worse, affect our *PC* readers as well. When we review a category of products, like word processors, we have to decide on the packages to review (usually as many as possible), the reviewers to use, the level at which we should test the product, and the factors that will be of most importance to our readers.

One of the reasons that project managers have become necessary to *PC Magazine's* ambitious product evaluations is that we believe there has to be a single editorial viewpoint on a subject. For example, in this issue's Word Processing Update, Phil Wiswell served as project manager, overseeing all the testing procedures, technical assistants, and product reviewers. Wiswell put four of our veteran reviewers—Vincent Puglia, M. David Stone, Robin Raskin, and Charles Petzold—to work on the testing procedure. They are all very sharp—and very opinionated—individuals so it follows that they may not all agree on just what makes one word processor better than the next. Puglia may favor word processors



that do lightning-fast search-and-replace procedures; Raskin may insist on advanced formatting capabilities; and Stone, perhaps, demands programmability. If Stone is not impressed, he might be tempted to lambast a program that Raskin or Puglia find to be perfectly adequate for their purposes.

Justice for All

Part of Wiswell's job is to see that justice is done to all of the products reviewed. He put together questionnaires that delineated all the important functions that word processors should contain, and he asked the testers for objective answers. He made sure that all testers were thoroughly conversant with each program before they ran it through the timing and keystroke problems that would eventually appear on the charts.

And he checked over the resulting bar charts and tables with a fine-tooth comb before submitting it for further checking by associate editor Jennifer de Jong.

First-Class Accommodations

Of course, no two projects are quite the same. In this case, the testers were excited to learn that they would inaugurate the *PC* Lab. Unfortunately, the Lab wasn't quite ready for them.

"We opened the new *PC* testing facilities in grandiose style," Wiswell grins. "No walls, no ceiling, no air, no water, no bathrooms. There were electricians, plumbers, and sheet metal riveters above, below, and to the right and left of every tester. Sheetrock dust was syphoning down into PCs," illustrating, he added, shaking his head in wonderment, that "PCs are indeed hardy machines."

Another one of the project manager's unofficial jobs is to soothe the temperaments of the testers when little problems crop up. There are several effective ways to ease the discomfort of a writer who has spent 10 or so hours wrestling with a product review under less than ideal conditions, but one of the best methods is to promise the writer that he or she will be permitted to play with a new and exciting piece of hardware.

An AT Pacifier

Another project manager recently pacified Winn Rosch, one of *PC's* top technical writers, with a review project of five multifunction boards made specifically for the AT. It is no secret around the

microcomputer marketplace that the AT is one of the most versatile pieces of hardware to hit town since the PC itself. However, it is a firm tenet of the industry that what is good can be made better, and

Rosch has found several good ways to do just that in "AT Multifunction Boards: The Fast Five."

While project managers come and go, there are some things you can always

count on at *PC Magazine*. For instance, you know that Peter Norton will never be without an opinion, nor will he ever be afraid to express it.

In this issue, Norton (who acts as his own project manager) is certainly not shy about telling us what his all-time favorite software packages are in the second part of his two-part series on "Ye Perfekt PC System." If his hardware recommendations in last issue's Norton Chronicles are any indication, his opinions will be thought-provoking. Though his methods for choosing the best word processing systems may not be quite so scientific as the methods used in our cover package, you can be sure his insights are based on solid experience.

Column Leaps

In this issue, *PC Magazine* inaugurates two new columns. In the debut of "Quantum Leap," Ron Jeffries begins his looks into the computer future, examining how optical disks will allow PCs to access upwards of a billion bytes of data. Jeffries, author of *The Jeffries Report*, discusses the new media that will usher PCs into yet another era: the age of the gigabyte.

With the second column, "Computers in Society," Steven Augarten takes us to a California (of course) restaurant that uses a PC to inventory food and take orders through a hand-held waitron-friendly terminal. Digital dining is the focus of his first look at computers' effect on the people whose lives they supposedly enhance.

Jeffries' column will appear in every issue of *PC Magazine*. Augarten will alternate with Stephen Manes, who is moving his iconoclastic opinions after a successful run in *PC News*.

You can also be sure that the people at Price Waterhouse know their stuff, so you'll want to pay close attention to what they say about *CPA+*, an integrated accounting package based on Lotus's *1-2-3*.

Let's see . . . was there anything else? Oh yes, I almost forgot about Dara Pearlman's footnote to the word processing project, which is about, appropriately enough, footnoting. Have I forgotten anything? Maybe I should get a project manager of my own. ■

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The NUMBER SMASHER is an upgrade product for 8088 based PCs and compatibles. It works on the IBM-PC and XT, the COMPAQ and compatibles manufactured to the IBM-PC hardware standard. Contact MicroWay or your local MicroWay Installation Center for technical specifications and supporting benchmarks.

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If Only 'C'

Were as Easy as BASIC

RUN/C is different. You can write and run your program in tandem. Like BASIC it has a couple of dozen commands such as LOAD, MERGE, SAVE, and FILES. It has an editor. You can INSERT lines and EDIT lines and LIST and DELETE lines on the spot. The most commonly used commands are built into the function keys, so you don't have to spell them out.

Then just say RUN. Your program executes instantly. If an error halts it, RUN/C explains why and where. You just EDIT the line, then and there, and RUN again.

A Great Time Saver for C Professionals

If you are already a C user, you undoubtedly sense the tremendous time savings of getting out of the compiler loop. You've probably been waiting for an interpreter. Ultimately, you'll want to hand your work to a compiler, for linking, for speed of execution. But RUN/C gives you a fast first test. It is superb for blissing away at a cluster of functions until proven unconstructible and suitable for acceptance into the Great Project.

RUN/C lets a pro develop and test code rapidly, without heavy checking. No more making things extra tidy to Get-Ready-For-The-Compiler, where a forgotten semicolon draws fifteen minutes in the penalty

box. With RUN/C you can try out things devil may care. Let it find your typos and malapropos. It's nothing to change them and re-RUN.

An Ideal Way to Learn

If you are a newcomer to C, RUN/C makes a splendid teacher. Its manual is as big as all outdoors. It contains not just instructions how to use RUN/C, but its 475-pages provide a thorough-going demonstration of the C language itself. Every feature of RUN/C.

- all the language keywords like "for" and "while" and "case"
- all the built-in functions like "printf" and "gets" and "puts" and "malloc"
- all of RUN/C's commands like "EDIT" and "LIST" and "MERGE"
- all the data types like "char" and "double"

— all are presented in a single alphabetical procession across most of the book. Each is accorded its own macro-chapter with examples of how to use. Over 100 of these chapters are devoted to RUN/C's built-in functions, and every one lets a sample program showing how it is used. These sample programs are on the disk. So as you read them in the manual, you can run them on the screen, see what they do, discover why they do it. And tinker with them, try things out, see what effects your changes have.

How RUN/C Does It

RUN/C handles the differences between the compiler and interpreter environments with great common sense. As an interpreter, it expects nothing but source, but includes can pull in .define and other source code files — functions you have already written, for example, or functions from commercial libraries which provide source code, like Greenleaf and BASIC-C. The included files stay hidden. They don't blow your listings. And they don't SAVE with the main you're working on. No littering your system with hazardous copies (no point mimicking that 'feature' of BASIC).

Or, external files may be MERGED into your listing at any point — these will display and SAVE with the host file.

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The more you look, the more powerful this product gets. It has valuable tracking toggles to show what's going on behind the scenes as a program executes. Switch on TRON, which displays on screen each line of source code as it executes (intermingled with what the program puts to the screen). It shows just where you were in the program when it departed for the back of beyond. Or try TRACE, which shows the current values of all variables referred to in a source line each time it is encountered. Or turn on PRON and then let a program after a run, each line appears with a number as in "C12: print" something? which says that the line was executed twelve times, a vivid picture where to optimize for efficiency.

Then, more, RUN/C has just added interchanges for PC DOS users, functions which tell execution of your program to directly call for services from the operating system, and then return to your program right where it left off.

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And more still. RUN/C has a SHELL command which will make any operating system command, with both RUN/C and your program still in memory. No need to exit and reload everything.

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LATTICE C COMPILER

Over 25,000 Users Make it the Best Seller by Far

Lattice C has been the standard-bearer compiler for years. Peter Norton in PC Magazine (3/8/89) said, "best for systems programming, right code, total control of what goes on, noticeably better than any of its competitors." After reviewing new compilers for the PC, the PC Tech Journal unerringly declared Lattice C "best for software development." It compiles fast and produces fast programs.

When Lattice C appeared, there was nothing comparable. Ever since, software developers have created exceptional tools and function libraries to marry into Lattice C. Programmers now have an enormous resource of libraries and utilities intended for Lattice C to speed their work. That's a vital consideration in choosing a compiler. Better check whether the latest genius may have only geniuses to go with it.

Lattice C runs on virtually any computer using an 8088 or 8086 chip, and generates code which optimizes use of the 8087 chips, if present. Create your source files with any word processor or text editor and Lattice C will compile them into fast 8086 object modules for linking to other modules by DCLink or our Parallel Linker.

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Special Combination Lattice C and CDebugger

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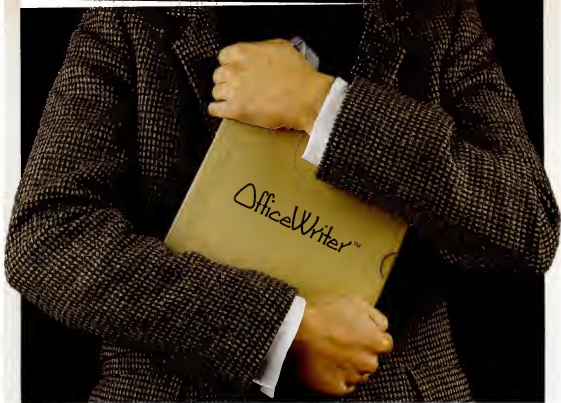
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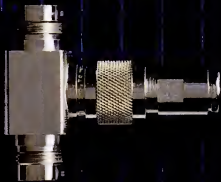
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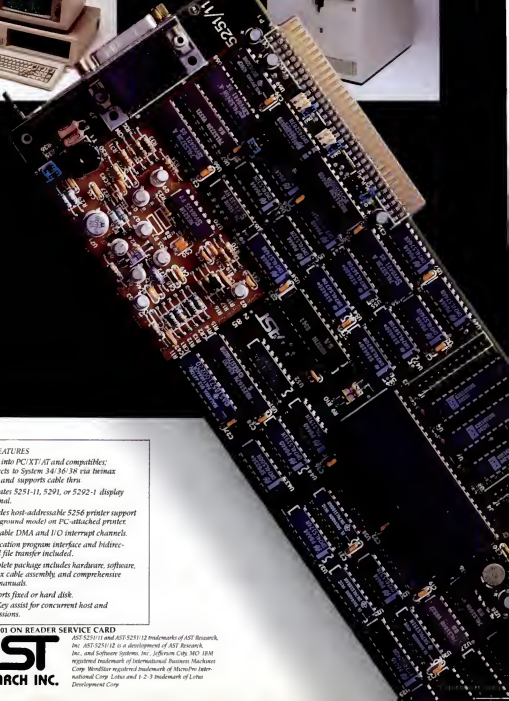
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Rivals Toss Stones At Microsoft Windows

BY CHARLES BERMANT

NEW YORK—Microsoft's long-awaited Windows is ready for release, and most of its competitors have begun heaving bricks at it. With TopView already threatening the manufacturers of windowing software, Microsoft's much ballyhooed entry into the field is being met with the same sort of so-what reaction Pepsi gave the new Coke.

"I don't see it as a competitor," says Therese Myers, president of Quarterdeck Office Systems in Santa Monica, Calif., the makers of DESQ. "There is still a philosophical difference, as it [Windows] doesn't run off-the-shelf software. Our efforts have been concentrated on competing with TopView."

Myers says that Windows cannot run concurrently with programs, but instead "steps aside" when another program is called up. This switch-off limits the program, she says, and mandates that the user rewrite programs to work fully with Windows. She concedes that the program is "nice," adding that the finished product is a lot faster than other versions she had seen.

"TopView will command software developers. If Windows doesn't get people to write for it, Microsoft will have to create its own applications."

This idea was seconded by Andrea Skov, vice president of marketing for Indian Ridge Enterprises, the manufacturer of WindowMaster. She says,

"The fact that you have to rewrite programs to use them with Windows means that it will not pose any competition to us. I think applications vendors will write for TopView before they write for Windows."

"The obvious question is: Do

they have a product that's solid if they can't ship to retail?" says John Meyer, director of marketing at Digital Research, makers of GEM. "We've seen various versions; it certainly runs. But when a product is delayed for this long, it's for one of two rea-

sons. Either they're trying to add new features, which we haven't seen any evidence of, or they're having a heck of a time making it work the way they want."

At press time many vendors
(continued on next page)

IBM Announces Workstation ATs

BY CHARLES BERMANT

RYE BROOK, N.Y.—IBM has increased the scope of the higher end of its PC line with AT versions of the 3270-PC

workstation and a network server that bridges the gap between all of IBM's computer families.

The 3270 Personal Computer AT is available with 512K or 640K of internal memory and 1.2 megabytes of diskette storage. Fixed disk capacity up to 40 MB is available. As with the

original 3270 PC, the new machine is able to display data from four host computers and can store information from these sources for later use.

The System/36 PC, a network server that combines a 5364 processor and an attached PC, allows multiple use and access to data from both the PC and System/36 families. The CPU can be used as a system console, a System/36 workstation, or a standalone PC.

The base price for the Sys-
(continued on next page)



New additions to IBM's product line bridge the gaps in its personal computer family.

Panasonic Exec Partner Joins the Marketplace

BY JANE MINTZER

SECAUCUS, N.J.—Panasonic Industrial Company has announced its new 16-bit, IBM PC-compatible Exec Partner portable computer. The new Panasonic features a 25-line by 80-column high-resolution gas-plasma display and comes with its own built-in printer.

The Exec Partner, with 256K RAM expandable to 640K, has two floppy disk drives, an 8087-2 math coprocessor socket, serial and parallel ports to which peripherals and accessories can be attached, an XT-size 62-pin expansion slot, and an 8086-2 microprocessor that can run as fast as 7.16 MHz.

The Exec Partner's dimensions (21.25 inches long, 16 inches wide, and 5 inches high) and weight (28 pounds) qualify it as a fairly compact package. MS-DOS Version 2.11 and

BASICA Version 2.0 are both standard on the new machine.

The built-in printer, which is IBM graphics compatible, operates in two modes—either as a 60-cps thermal printer or as a 40-cps thermal transfer ribbon cartridge. It also has the ability

to print as wide as 132 columns. Panasonic says that the plasma display is free of flicker and has a fast response time.

The Exec Partner retails for \$2,595, and Panasonic expects to make a hard disk version available shortly.

For more information, contact Panasonic Industrial Company, One Panasonic Way, Secaucus, NJ 07094, (201) 348-7000. ■



Panasonic's Exec Partner

IBM Screens Videotex Software for PC Line

IBM chose the New York PC Expo to demonstrate its latest offerings in several programs designed to give videotex capabilities to its computers.

PC/Videotex-Graphic Artist Facility (VTXGRAF) lets an IBM PC, XT, or AT create and edit videotex frames of color graphics and text. The material can then be stored in a host videotex terminal. IBM also offers a graphics input pad dedi-

cated to frame creation.

Videotex/370 will allow IBM mainframes to act as a videotex host that supports North American Presentation Level Protocol Syntax (NAPLPS) as well as color or monochrome ASCII text.

Also offered by IBM are two programs that turn a personal computer into a videotex terminal that can communicate with videotex hosts that will run such

software programs like *Series I Videotex System (SVS/I)* and *Videotex/370*.

PC/Videotex lets a PC communicate with a videotex host that supports the NAPLPS standard, while PC/Colorview lets you access a host offering monochrome and color ASCII videotex.

For more information, contact IBM's Information Systems Group at 900 King St., Rye Brook, NY 10573, (914) 934-4000. ■

Microsoft Windows

(continued from preceding page)

had not heard about Windows' imminent release. Says Skov, "We hear of new competition once a week that doesn't deliver." Adds Judy Mervis of Digital Research, "Any vendor that is late in releasing a product reflects badly on all software vendors. This creates a skepticism that isn't warranted."

Shard to Get

Steve Hersee, vice president of marketing for Lattice Inc. in

Glen Ellyn, Ill., says that Windows already has a head start on TopView because it has been available to OEMs for some time. He added that Lattice, his company's programming tool, will make it easy for its user base to move over to Windows should they so desire.

Still, Microsoft may have to give the \$99 Windows a big push. "Generally, it seems that the reception hasn't been all that hot," says Mike Nolan, senior

account representative at Businessland in Rockville, Md. "So far, it has not been a requested item. There is no one beating down the door. It will have to be sold."

The question remains, however, who is going to do the hard sell? According to Nolan, "The whole genre of window-type products (TopView is in the same ballpark)," will need a big push. He continues, "As a salesperson, I'm not going to spend a lot of time selling a \$100 product." ■

Workstation AT's

(continued from preceding page)

tem/36 PC is under \$6,000. Its processor comes with a standard 256K of system memory, expandable to 512K. One 40-MB fixed disk is also included, with a second available as an option. The machine contains a single 5 $\frac{1}{4}$ -inch 1.2-MB disk drive for loading System/36-formatted programs and data. A conversion program for the 8-inch disks now used on System/36 machines has also been announced.

The graphics capability of the company's System/370 computers has been enhanced by the \$2,995 3179 model G display station and the \$295 3739 expansion unit. The 3179 has a 14-inch 8-color VDT that can display either 1,920 or 2,560 alphanumeric characters, depending on type style. The 3739 facilitates the attachment of the IBM graphics cursor mouse and color plotters and printers.

IBM is attempting to break down barriers with new ASCII terminals that connect to non-IBM computers. The IBM 3161 can emulate the ADDS Viewpoint, Televideo 910, Hazeltel 1500, and the Lear Sigler ADM3A and ADM5. The 3163 terminal's options include windowing, partitioning, smooth scrolling, and double-height and -width characters.

Both displays include a nonglare, nonsmudge screen. The 3161 is priced at \$695, while the 3163 costs \$1,095. Both are available immediately.

Finally, IBM unveiled three high-speed modems with built-in diagnostic capabilities. The 5865 transmits data up to 9,600 bps and costs \$4,000, and the 14,400-bps 5866 is priced at \$6,000. Both are designed to work in computer networks that use IBM's Systems Network Architecture. The \$595 5811 is a limited-distance modem designed for transmitting data over distances up to 15 miles. Targeted for customers with large in-house networks, the 5811 supports synchronous communication from 2,400 to 192,000 bps. All three modems will be available in standalone and rack-mounted versions. ■

Boards From Quadram, AST Promise Much More Memory

BY JAMES LANGDELL

NEW YORK—AST is on a RAMpage, and Quadram is launching Liberty II. Those are the names these two leading makers of PC add-on boards are giving to their new products. The recently announced boards are similar to Intel's expanded-

memory Above Board cards, which can pack as much as 8 megabytes of RAM into a PC.

Although AST and Quadram say they've adopted the new Lotus/Intel standard for accessing expanded memory, they say they are taking action to raise that standard their own way.

AST and Quadram have designed their boards to provide up to 2 MB of memory to applications that follow the Lotus/Intel standard, but with the aid of Ashton-Tate, the two companies have also developed a "superset" that would permit expanded memory to interact with an even greater amount of conventional memory.

"We felt we could offer a more efficient system," says Tom Yuen, cofounder and executive vice president of AST.

Compatibility Questions

Intel officials, however, question whether this superset will be fully compatible with the present expanded memory standard or with future versions of DOS. In fact, even if the superset is compatible, Intel warns, it might do more harm than good.

"The industry is maturing and standards become more and more important," says Jim Johnson, operations manager of Intel's Personal Computer Enhancement Operation. "To

make something just a little better isn't so important anymore. Having supersets around is detrimental to the end users." He points to UNIX as an example of the dangers of the superset phenomenon. "You can't write a universal program in UNIX—you have to decide which version to write for."

In an attempt to lure the industry to accept their enhancement and specifications, AST and Quadram are giving the details of their expanded-

ed memory technique to other software and hardware companies, as have Intel and Lotus. Ashton-Tate says that its next release of *Framework*, available in the third quarter of this year, will accommodate the superset as well as the Lotus/Intel standard. Several other software companies, including Digital Research, Borland International, and Sorcim/IUS, announced plans to have their programs take advantage of the AST/Quadram superset.

Turning the Pages

Both the Lotus/Intel and the AST/Quadram system handle expanded memory through software that sets aside a group of 16K pages within conventional memory (the single megabyte of addresses that a PC's 8088 processor normally can identify). Each of these 16K pages acts as a window through which the processor can contact a 16K page found on an expanded memory board. This portion of expanded memory is mapped onto conventional memory by storing its address in a page register that's associated with the window back in conventional memory. As each 16K segment of expanded memory is needed,

its address is placed in one of these page registers.

The Lotus/Intel specifications provide 4 such page registers and 4 16K windows; they must be located in a contiguous 64K "page frame" somewhere between 784K and 960K in conventional memory.

The AST/Quadram superset, however, increases the page registers to 64, enough to allow every 16K segment in conventional memory that isn't otherwise in use to be identified as a page window. These page windows need not be contiguous, and the superset even allows them to be located in the 640K of conventional memory that DOS handles directly.

Speed Shifting

The actual speed increases made possible by the superset will depend on how individual

applications programs treat the expanded memory. But, in theory, says Stephen Lawton, AST's public relations manager, having more page registers available will reduce the total processing time needed to shift expanded memory in and out of page windows.

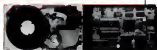
Although Lotus announced that its updated programs, *Symphony* Release 1.1 and *1-2-3* Release 2.0, will be able to handle 4 megabytes of expanded memory, the new *Framework* release and Sorcim/IUS's *SuperCalc 3* Release 2.1 will be able to make use of the full 8 megabytes that can be installed in a PC with 4 expanded memory cards, whether they're made by Intel, AST, or Quadram.

Lotus is limited to 4 megabytes because its programs use only the first 640K of conventional memory in which to store the extended-memory pointers. "But," says Walter Feigenson, director of the OEM business unit for Sorcim/IUS, "I don't think many people will complain to Lotus about only being able to make a 4-MB spreadsheet." ■



AST's 2-megabyte RAMpage

It's a Disk! It's a Card! It's a Hardcard!



BY JAMES LANGDELL

MILPITAS, Calif.—"A hard disk on a board." That was the advance word on Plus Development's first product. We were relieved to see that the Hardcard wasn't a 10-megabyte hunk of bubble memory drooping across a PC's slots. In fact, it's a 10-MB hard disk packed onto a standard-size add-on board.

The Hardcard is a light 2 pounds and has a small 10.9-watt appetite, thanks to its CMOS chips. Since the Hardcard needs only a third as much power as the XT's hard disk, you can plug it into a PC without upgrading the power supply.

"We wanted to make installing a hard disk as easy as plugging in a memory board," says

Stephen M. Berkley, president of Plus Development Corp.

In a PC the Hardcard's 10-MB disk is called drive C:. An installation program sets up the hard disk so you can boot from it directly. In addition, a Hardcard can tack an additional 10 megabytes of storage onto an XT; it's treated as drive D:.

The Hardcard package, list price \$1,095, includes a file-management program called *Hardcard Directory*, which will be available from computer retailers in October. Matsushita Kotobuki Electronics will manufacture the Hardcard for Plus Development, which is a subsidiary of Quantum Corp. For further information, contact Plus Development Corp., 1778 McCarthy Blvd., Milpitas, CA 95035, (408) 946-3700. ■

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Drawing Back the Curtain on Windows Shows Microsoft Has a Clear Edge

FIRST LOOK

BY BILL MACHROME

Windows is here. It's almost 4 months behind the original ship date, but it's here. Microsoft, sensitive to the flak they've taken in the trade press, has released Windows with a whisper rather than a shout.

And that's too bad. Based on our first look, Windows is an impressive product, well worth the fancy rollout it would have received last spring.

Windows is a DOS-enhancing environment. It's also a word processor, a communications manager, an alarm clock, a calendar, a memory manager, a card filer, a task switcher, and a screen painting program. It's also \$99.

Worth the View

For your hundred bucks you get the Windows display and memory manager, which lets you load more applications than you can actually fit in memory. You also get *Microsoft Write*, a fairly powerful word processor, written just for Windows; *Terminal*, a serial communications manager that can dial and log on to the services of your choice through a Hayes-compatible modem; and *Notepad*, *Cardfile*, *Calendar*, *Calculator*, and *Clock*, which all do what their

names suggest. In addition, you get a game, *Reversi* (marketed commercially as *Othello*), for your leisure time and to sharpen your mousing skills.

You also get a screen painting program, *Microsoft Paint*, comparable to most of the others on the market, except that it always runs in high-resolution black and white. Color is not available.

Like IBM's TopView, Windows works best with a mouse. Unlike TopView, Windows is tolerable without one. The keyboard substitutions for mouse moves and clicks are well thought out, except for the long-standing Microsoft curse of making you use the tab key when your instincts are telling you to use the cursor keys.

Dynamic Developments

The extra 4 months that Windows spent in the development shop shows, especially in the included application programs. Microsoft vice president Steve Ballmer says, "Write has 70 or 75 percent of Word's function. And while *Terminal* has nowhere near the programmability of *Microsoft Access*, it does most everything that people want a communications program to do."

Windows is TopView compatible. It understands IBM Program Information Files

(PIFs), so that any program that is TopView-aware runs without any fuss in Windows. It also follows IBM's excellent design, allowing you to prespecify the way you want your programs to window.

an all-things-to-all-people package.

You'll want 640K to maximize its utility, and Windows can use even more. It swaps programs out to disk but will use RAMdisk, 80286 extended

Like IBM's TopView, Windows works best with a mouse. Unlike TopView, it's tolerable without one.

The biggest difference between TopView and Windows is that TopView is a multitasking executive, which timeslices all applications, while Windows switches tasks only to keep the screen updated. If an application running under Windows is in a CPU-intensive processing loop, Windows will not interrupt it to let other tasks run. The advantage of this approach is that Windows imposes virtually no processing overhead penalty. TopView, conversely, takes roughly 10 percent of your machine's time just to run itself.

Power has its price. Windows with *Write* takes up nearly three quarters of a megabyte on your hard disk, but it can replace your word processor, communications program, paint program, and pop-up utility software for most applications. It's as close as anyone has come to

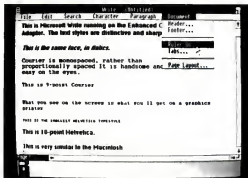
memory, or Lotus/Intel expanded memory for swapping if it's available. Task swap time can be cut to less than a second by using memory for swapping, and that's fast in anybody's book.

Screening Room

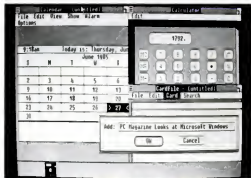
Windows runs on the Enhanced Graphics Adapter in high-resolution color. It's a sight to behold. You can vary the color through a rainbow of values, and you can select the color, density, and texture of background, characters, foreground, highlight bars, and more. With power comes responsibility, however, since this capability lets you make screens arbitrarily ugly.

TopView outperforms Windows when it comes to running your old applications in win-

(continued on page 38)



Microsoft's Write works best on fast machines with an Enhanced Graphics Adapter.



Overlapping windows give the program a decidedly Macintosh-like flavor.

Microsoft Edge (continued from page 37)

dows smaller than the full screen. While TopView bends over backwards to make sure that the area of the screen you're most interested in stays on the screen, Windows is more likely to let text disappear behind the edge of a window, but the behavior of both products depends on the application.

Windows also has a clipboard, patterned after the Macintosh's, that allows data to be moved among applications. Like GEM, Windows permits multiple data types on its clipboard. The clipboard is an ideal way to save a piece of a screen to disk, too.

True to its claim, Windows does not exact any penalty for its presence. Rather, it lurks in the background, waiting to switch tasks or execute utilities. It manages the screen very smoothly, even on slow (4.77 MHz) machines. You do encounter pauses when you switch from one application to another, but they're shorter than if you got out of one application, back into DOS, and into another application. The performance on a souped-up PC AT or Compaq 286 is whiz-bang. The swaps are nearly instantaneous, and the screen responds to your every command and mouse movement.

Write is Right

Write is a small jewel in Windows's crown. On a standard color monitor it sports a proportional Helvetica typeface and a constant-space Courier. Both can be scaled to 8, 10, and

12 points and rendered in bold-face or italic. Slow machines are a little ponderous when you're typing in italic, but the effect is hardly noticeable on an AT.

The difference on an EGA is breathtaking. The characters are well defined, and several more

portional characters.

On the negative side, you have to be in love with pull-down menus to enjoy *Write*. Some of the more frequently used commands, such as bold and italic, are available on function keys, but you basically have to rely on the pull-down

TopView outperforms Windows when it comes to running your old applications in windows smaller than the full screen.

typefaces are available, including some handsome outline faces. Everything runs faster, too.

The proportional font can get nearly twice as many characters on the screen as the Courier, an advantage if you like to work with lots of text. As with other windowing environments, you can run multiple copies of *Write*. Nothing stops you from even editing the same file from two different *Write* sessions. It's not as fast as TopView's hot-keying from one session to another, but it's tolerable.

The documents that *Write* creates are stored in ASCII but with a header and a footer that describe the type style and other settings.

Printing invokes long delays as things swap in and out to disk, but the wait is worth it if you have a graphics printer. What you get on the printer is a faithful representation of the screen, right down to the pro-

portional characters. It's a nice-enough editor for occasional use, but I wouldn't want to use it for my daily work. It's just too slow. The notepad is handier for quick use and saves its text as pure ASCII.

Feature Presentations

Terminal is a minimal modem manager. It lacks many of the functions that you've come to expect in a communications program. It, too, is overly reliant on pull-down menus. Turning the capture buffer on and off, for example, should be toggled by a function key or a single Alt-key. It should also display an icon to indicate when capture is on. The terminal emulator is nice, since you get both VT-52 and ANSI, but I'd trade them for a little more ease of use. But then, *Terminal* comes free with Windows. You can't expect everything for nothing.

Paint is a very capable program, with a fundamental

smoothness of operation, many options, clear icons, and no color. Considering how everything else in Windows can run in color, it's safe to speculate that a color version of *Paint* will come later as an extra-cost option.

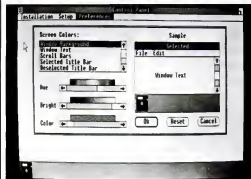
Cardfile is an interesting application. It allows you to title "index cards" on the screen, then enter whatever information you want on the cards themselves, unmindful of fields and data types. It will search the cards for any word or phrase contained on a card, then sort the cards by occurrence. While you can use the clipboard to move data from a card to any other application, it should have been integrated better with them, especially the terminal program. I would have liked to be able to point at a phone number on a card and have it dial the number.

The price/performance point set by Windows is remarkable. It clearly offers the most attractive combination of features and performance of any windowing package we have looked at. Although the applications are immature and could use some streamlining, Windows will become a powerful tool for power users, and it lays a solid groundwork for future generations of PC applications. ■

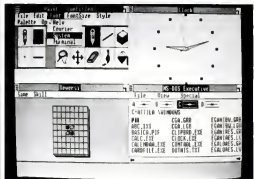
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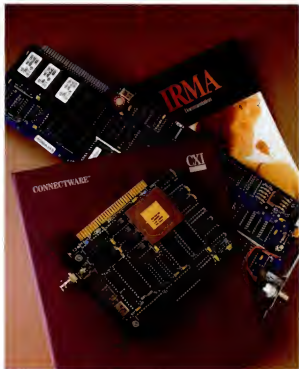
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NEWS IN BRIEF BY JANE MINTZER

Printer Connections . . . One of the highlights of the recent PC Expo in New York City was **Applied Creative Technology, Inc.'s** printer buffer and network. The Systemizer network allows up to 15 computers (not necessarily compatible ones), each equipped with a Systemizer unit, to access one or more printers, creating a printer-sharing network.

A solid-state tape recorder feature stores, records, plays back (prints), and erases data from two different tapes. The company recommends using this feature to combine output from different printers on a single page.

Applied Creative Technology says that the Systemizer can also be used as a standalone, second-generation buffer. With 16K RAM, the Systemizer costs \$299 per station (\$369 with 64K RAM). The network version of the Systemizer costs \$386 per station with 16K and \$439 per station with 64K RAM (the company says it does, however, give corporate discounts for quantity purchases).

Applied Creative Technology, Inc. is located at 2156 W. Northwest Hwy., #303, Dallas, TX 75220, (214) 556-2916 or (800) 433-5373.

Never the Twain Shall Meet? . . . Now, if you want to use your PC software but you like a lot of the Macintosh's capabilities, you can have the best of both corporate giants. At PC Expo **Danya Communications** unveiled its MacCharlie—a coprocessor that lets Macintosh business users run their PC-compatible software and printers on their Macintosh.

MacCharlie comes with a keyboard extension with 28 extra function keys that fits right over the Macintosh's existing keyboard. The MacCharlie expansion unit, which fits alongside the Mac, has PC-compatible disk drives. The standard configuration has a single disk

drive and 256K RAM for \$1,195. The MacCharlie Plus has 640K RAM, two disk drives, and sells for \$1,895. Both versions run MS-DOS version 3.1 and GWBASIC when you do PC applications in the MacCharlie window; the standard Macintosh operating system runs when you do Apple applications.

Danya Communications's headquarters are at 50 S. Main St., #530, Salt Lake City, UT 84144, (801) 531-0600.

Multi-ple Mates . . . After building a reputation as a one-product company and after having that product (an upper-end word processor) consistently sit at the top of sales charts, **Multimate International** is branching out with three new word processors. In one move the Hartford, Conn. company has increased its scope: *Just Write*, once intended as a PCjr-specific product, is priced at \$249, while *MultiMate Advantage* and *MultiMate Executive*, both \$595, require 320K and are seeking to become the Mercedes-Benz and the Rolls-Royce of the word processing world.

For more information contact Multimate International Corporation located at 52 Oakland Ave. North, East Hartford, CT 06108, (203) 522-2166.

Hard Disks to Go . . . The minicomputer practice of using removable hard disks for backup has now been translated into the PC environment. **Kustom Electronics** is marketing the Sunflower line. Designed to blend in with IBM and AT&T PCs, the line features a variety of fixed/removable drives that range in price from \$1,895 to \$3,395. Company representatives say that the removable disks, which cost \$110 per 10 MB, are a more stable back-up media than tape.

Kustom, which used to manufacture guitar amplifiers popular with rock bands in the 1970s, is located at 8320 Nieman Rd., Lenexa, KS. 66214-1510 (800) 255-6311.

Born to Move . . . News from IBM: As of July 1986 it will be moving most of the key administrative staff members of its Entry Systems Division from Boca Raton, Fla. to Montvale, N.J. The Entry Systems Division makes and markets the PC and other PC family products.



ACT's Systemizer unit

TRANSMISSIONS BY CRAIG L. STARK

A linkup to the lowdown about what's happening on PC Magazine's Interactive Reader Service

Did you know there's a school for English nannies in Cleveland? If not entirely typical of the requests I get to put listings on PC-IRS, the quietly imperative voice on the phone conveyed the distinct impression I'd be locked in the cupboard and denied my tea if I refused. Sorry, we can't take user bulletins or programs—handling the volume and calls for PC's own free, downloadable listings is all we can manage.

If your stiff upper lip is beginning to curl in frustration at having to wait so long to get on-line with PC's Interactive Reader Service, take heart. Work on our new seven-user system continues apace, and it looks as if another couple of weeks should see it up and running.

PC's new system will require the set-up parameters we already recommend: No parity, 8 data bits, 1 stop bit, and use of the Xmodem file-transfer protocol. So if your communications software doesn't support Xmodem (old versions of *SmartCom II* and *CrossTalk* don't), now's the time to update.

Legions of users keep asking why our copyright notice forbids you to put PC-IRS programs on other BBSs. The answer is that we can't give away other people's wallets. The programs on PC-IRS are copyright-

ed by their authors. We buy the right to publish them in PC and to reprint them on the board. But our authors can still sell other publication rights (to a book publisher, for example) so long as the programs are not put in the public domain. So, downloading for your own individual use is fine: That's what PC-IRS is for. Distribution to others, through any uploading to other BBSs, makes you not a good Samaritan, but a software pirate.

We've now split the PC indexes for Volume 3 (1984) into

manageable chunks and added indexes for this year's issues through Number 12. User groups are now listed by areas, and a number of new BBSs have been added. New from the Programming column this issue is John Dickinson's BACopy in .COM, .ASC (BASIC), and .ASM forms. The source .ASM listing for this super utility is not printed in the magazine, but it is on the board. We've also added the promised macro listing from Volume 15's Power User. We need, however, to hear from you how much (if any) of the material from Power User, Spreadsheet Clinic, and User-to-User we should put on PC-IRS. So leave a comment when you have your modem dial us up at (212) 696-0360.

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PROJECT MANAGEMENT								
Harvard Proj. Mgr	395	219	79			Uniview	99	75
Harvard Total Proj. Mgr	495	279	99			HARDWARE		
Microsoft Project	250	159	50			AST Advantage (for AT)	595	399
SuperProject (Sorcsm)	395	219	79			AST 6 Pack OK	340	229
GRAPHICS								
Chain Master	395	249	79			AST 6 Pack OK w/Game	390	259
Sign Master	245	179	49			AST 6 Pack 64K	395	249
PFS Graph	140	89	29			AST 6 Pack 64K w/Game	445	279
Microsoft Chart	250	159	50			Hayes 1200B	549	399
Dr HALO	100	79	20			Hayes 2400	899	619
						TextMate P134D	995	555
						Hercules Color	245	179
BUSINESS ACCOUNTING								
State of the Art	\$595	\$399	\$119					
BPI Systems	595	369	119					
IPS Business Acct	595	299	119					
Open Systems	695	399	139					
Real Word-MBSI	695	399	139					
In House Accountant	180	129	38					
UTILITIES								
SuperKey	65	49	15					
Northern Unit 3.0	100	59	20					
PROKEY 4.0 (NEW)	130	99	26					
Solekick (Borland)	85	59	17					
COMMUNICATIONS								
Crosstalk XVI	195	99	39					
Relay	149	99	30					
Remote	195	139	39					
PFS Access	95	70	19					
SPREADSHEETS/INTEGRATED								
ABILITY	495	319	99					
ENABLE	699	379	140					
MultiPlan (Microsoft)	195	139	39					
Deigo	199	159	40					
CPA PLUS	695	499	129					
SMART Software System	895	649	179					
Open Access	695	399	139					
SuperCalc	395	199	79					
PERSONAL ACCOUNTING/FINANCE								
Home Accountant +	150	79	30					
Managing Your Money	199	119	40					
Dollar & Sense w/Fore	199	129	36					
Desk Organizer	99	79	19					
OTHER SOFTWARE								
SPSS/PC (xT Req d)	795	639	159					
Think-Tank	195	119	39					
Property Mgr (Cont)	495	319	99					
Management Edge	250	169	50					
Coxs Training	70	47	15					

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chip set. Adds 256 KB PC-AT
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build the PC-AT IDE should have
built in the first place.

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words, in the shortest
possible time. A labor
saver. A time saver.
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hard disk storage is no
place to be penny-wise and
pound foolish.

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These and other
important features do add
cost, but that makes a
premium drive.

Anything that can be
made, can be made
cheaper, even for less, offer
lower performance, and
probably die young.

Remember, usually
you get what you pay for,
and you ALWAYS get
what you don't.

ALL HARD DISKS ARE NOT CREATED EQUAL.

There are vast differences
in the speed and reliability
of Winchester hard disks.
Since the IBM PC-AT is an
incredibly fast machine, a
slow drive can make an AT
run like an XT.

So, before you get stuck
with a slow drive in your
AT, save your boss two
grand and buy an XT.

Or better yet, buy the AT
and avoid any drive with
Access Times over 40 milli-
seconds.

RELIABILITY: WHERE HAS ALL THE DATA GONE?

Now tell 'em the drive
must have a data protection
scheme. One that's
easy to use and reliable.

Winchester heads read
and write while "flying" a
few microns above the
data surface. If the heads
contact the recording
media, you risk a head
crash, and significant or
total data loss.

So, even a fast drive
without data protection is
virtually worthless. Frank-
ly, we'd rather sleep at
night.

BEWARE OF USER-DEPENDENT PROTECTION SCHEMES.

Some drives have a
safe landing zone for the
heads, but you need to call
a separate program to
send 'em there. If you
don't call that program,
and most folks won't, the
heads in these drives
ALWAYS land on data
when powered down.

The slightest bump or
vibration can move the
heads, wiping out those
data tracks. And the R/W
heads can become
contaminated, thus
increasing the error rate,
slowing down average
access until the whole drive
fails.

Consequently, those
drives offer a very high
risk of head crashes, a
false sense of security, and
little else.

What's your data
worth? \$200? \$400?
Specify AUTOMATIC
data protection. Atplus
has it. And it doesn't cost,
it pays.

PEACE OF MIND.

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park and lock of the heads
on power down.
This system provides
unparalleled head crash
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power loss to the drive,
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to a dedicated landing
zone before they can land
on your data.

Since this is 100%
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OUR DRIVES HAVE ALL BEEN TO BOOT CAMP.

Avoid drives that
CLAIM PC-AT compatibility
but can't BOOT the AT.

By the time you juggle the

diskettes necessary to use
one of those drives, the
phrase "user-hostile" will
have deep personal significance.

We believe that
computers ought to serve
people, not the other way
around.

BEWARE OF THE BARGAIN BAND-SCHLEPPEN.

Avoid drives with in-
expensive Hand-Stopper
positioner technology.
These were pretty good
way back in 1980, con-
sidering that's all anyone
had. But by today's stand-
ards, they're inaccurate
and very mechanical.

They waste time look-
ing for the right track to
read or write. And they're
slow to where near the
price you'll pay for 'em-in
more ways than one.

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Specify state-of-the-art
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This system uses a
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cessor to translate new
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exact track intended.

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tronically, with minimal
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FLASH: Russians Gain Computer Advantage

Here's a scoop we somehow missed: The supermarket tabloid *Weekly World News* reports that what Russian scientists first thought was satellite debris found in the Gobi Desert turned out to be computer parts that had been lying there for 25,000 years. The discovery was made in 1979, and it took the Russian technicians almost a year to re-assemble the parts and develop an accurate sketch of what the prehistoric PC looked like. The report goes on to say that carbon dating allowed the crew to determine its exact age.

The story's one source, who was of course unnamed, is quoted as saying the technology



was "state of the art for us today but was around 25,000 years ago. The Russians were forced to conclude that the computer parts malfunctioned and were left behind by space aliens."

Speculation is that it was not

an MS-DOS machine, and that it ran with a primitive form of CP/M. In addition to the technical magnitude of the discovery, the common fallacy that carbon dating can only test organic matter has now been torpedoed. ■

Pomposity and Circumstance

"For 3 millennia, to mention the lotus in the western world has been to evoke the character given it by Homer: The preferred food of a society of sybaritic, fuzzy-minded layabouts. In 3 years you have changed all that. Future historians may record the early 1980s as the time when a society that threatened to become one of the lotus eaters became instead a society of Lotus users."

—Commencement citation given to *Lotus Development* chairman Mitchell D. Kapor as he was awarded an honorary doctorate of humane letters from Boston University.

Nan Deska? Computer Beat Wrestler Again?

The ancient art of Sumo wrestling has been thrown into the 20th century by Koji Kitao, who is the only Sumo who uses a PC on the job. Kitao, a 21-year-old who, at 6'5", is one of the sport's tallest men, has input statistics on every working wrestler's strengths and weaknesses, amending them as needed.

Ofentimes Sumos don't know who they'll face until the day of the match, and there can be upwards of 50 wrestlers at any given tournament. Kitao, apparently, has decided not to rely on the time-honored Sumo tools of memory and instinct to plan his attack. His strategy has paid off. At 21 he is already a Sekiwake, the third-highest rank a Sumo can achieve. ■

Ashes to Ashes, DOS to DOS

The *Ogden (Utah) Herald-Examiner*, like most local papers, has used the slow, inconvenient process of taking obituaries over the phone. This method was fine for a two-horse town, but it became increasingly difficult as the area's population ballooned.

So the paper's editor asked funeral homes to use PCs to send obituary information di-

rectly into the newspaper's mainframe. This has made reporters' jobs easier, decreased the error margin, and, if you'll excuse the phrase, extended deadlines.

The news has caused concern among budding journalists who will now have to find some other way to pay their obit-desk dues. ■

Come away with me, Hortense, and I will fill your days with interesting, unusual, useful and humorous tales about the computer industry.

Oh, Alphonse, couldn't you just send them to *Communiqués*, PC Magazine, One Park Avenue, New York, NY 10016, 212-503-5276 MCI Mail 157-9301?



Nutmeg State Politicos Use PCs to Fill Their Potholes

The Connecticut State Department of Transportation has installed the nation's first videodisk-based highway evaluation system, which allows it to punch up pictures of any pothole in the state at the touch of a keystroke. The PC-controlled unit can store and retrieve over a million pictures of road; it is used to set priorities for highway repairs.

A truck drives up each state road and snaps a picture every 50 feet. The results are immediately transferred to videodisk, in what can only be described as white online fever.

Also, in Fairfield, Conn. two women are conquering forgetfulness with their "Let Us Remind You" service at (203) 372-6004, which will, for a \$25 annual fee, give you a monthly

computer printout of important dates. So far, people have asked to be reminded of everything from anniversaries to car-emission control inspections. For the terminally lazy the entrepreneurs will mail out greeting

cards for specified occasions, even forging the sender's name.

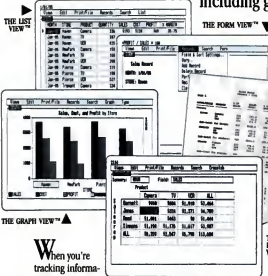
A report that the service had tapped into the state system and is reminding clients about specific potholes could not be confirmed. ■



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is \$1,295 (suggested retail price).

This board can be used with the AT&T PC 6300 or plug compatible personal computers such as the IBM PC, XT, AT, and the Compaq PC.

It digitizes and displays continuous-tone, TV-quality images on analog RGB monitors, composite color video monitors, and color TV sets with RF modulators.

For applications requiring display only capability, the AT&T Truevision Video Display Adapter offers the same image quality at a suggested retail price of \$695.

AT&T also offers software packages to complete the picture. For example, the AT&T Truevision Image Processing Software lets you manipulate real images in

real time. It also lets you use your PC to assemble and operate electronic slide shows quickly and easily.

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PC UPDATE by VIRGINIA DUDEK

NEW YORK - According to Raymond Speer, president of Connecticut Software in Rowayton, Conn., it took blood, sweat, tears, and "a little Moosehead beer" to get Version 5.0 of Printer Boss up and running. He claims the printer utility has been completely rewritten, and it now has features such as a command-line control from the batch file that allows the program to be automatically operated from an AUTOEXEC.BAT file when you boot DOS on the PC. Three letter quality print modes are included plus custom character font design, path-name support for hard disk use, and full ASCII character-set support. Users updating to Version 5.0 can get credit on the version they currently own and apply it towards the purchase of the new version, which sells for \$139.95. The credit amounts to 50 percent of the price they paid, since earlier versions of Printer Boss vary in price. Send the old program disk to Connecticut Software along with the difference in price.

Digital Communications Associates, Inc. of Alpharetta, Ga. announced enhancements to IRMAcom/3270 and IRMAcom/3270B, DCA's IBM 3270 controller emulators. New features include compatibility with the PC AT and light-pen applications plus "hot key" compatibility that lets users access the 3270 emulator by activating either a resident or nonresident program. Current users can receive free software upgrades directly from DCA.

In late 1985 DCA will announce additional releases of IRMAcom/3270 and IRMAcom/3270B that will support three new file transfer packages: IRMAcom FT/T50, IRMAcom FT/CMS, and IRMAcom FT/3270.

Confidentially speaking, United Software Security Inc. of McLean, Virginia, has updated PrivacyPlus, its PC data secu-

rity system. Version 2.0 features preconfigurable user options and a master key facility that recovers from lost passwords. The resident code feature allows the program to appear on command. An idle function key is included so the PC can be locked into whatever program is currently on screen when the user is away for a short time. An improved display, additional error protection, and an on-line directory manager are also included. Licensed users automatically receive a free update. Individual users must purchase the new version in its entirety in order to receive the enhancements.

Short takes: What goes up must come down. Paradise Systems of Brisbane, Calif. announced a price reduction on the Multi-Display Card. It now retails for \$279; down from \$495...Softshell Corporation in Bel Air, Md., is now shipping Version 1.1 of 3x5, their text management system for the PC. It now develops free-text databases and can index paper documents. For updates send \$4.95 to cover the cost of the disk...Users of BAKUP, a storage management system from InfoTools, Inc. in Mountain View, Calif., will note that InfoTools has been purchased by Software Integration, Inc. The Los Angeles-based company now provides all support and service for BAKUP...Version 4.1 of request, a data-base-management system from System Automation Software, Inc. of Silver Spring, Md., now includes a full-featured procedural language that allows production of ad-hoc reports. Custom menus can be created and modified directly from a separate menu module. The number of files per record has been expanded to 32,767, and dual floppy operation is now supported.

Be a contributor to PC Update. Write or call Virginia Dudek, PC Magazine, One Park Ave. NY, NY 10016 (212) 503-5265.

Peachtree Is Pruned, But Still Bears Fruit

BY CHARLES BERMANT

NORCROSS, Ga.—After several months of low-profile operation, Peachtree Software has reemerged with a new owner, a new strategy, and a retrenchment that may signal how software business will be done in the future.

The company, which had been owned by Management Science America Inc. (MSA) since 1981, was purchased by Intelligent Systems, a company that also owns Quadram. Since the \$1.1 million May transaction, Peachtree has sold off sev-

eral divisions, cut 75 percent of its staff, and narrowed its product focus. The Peachtree management will share quarters with Quadram, but the two manufacturers expect to operate independently.

No Pits

Several new Peachtree offerings were announced in the past year, but the product line has already been cut 49 percent since the Intelligent Systems acquisition. *Peactext 5000* will still be manufactured, and *Back to Basics* will continue as the company's flagship program.

Peachtree product sales fell off last fall after it was rumored MSA was going to shut the company down. According to Goodhew, the company is now "in a break-even situation" after losing \$1 million a month for a long time.

Ben Dyer, who sold Peachtree to MSA in 1981 and continues to work for the company as a consultant, says the sale "was a good thing, and I have no regrets." Goodhew, who worked for MSA for several years prior to the purchase, agrees, saying, "Without them, it would have been difficult to survive."

"The biggest misconception that we've had to fight is that MSA shut us down," Goodhew says. "Dealers think that we're



Leading the Peachtree pack. Bill Goodhew (left) and Ben Dyer.

out of business. We need to get the word out that this isn't true."

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Bushwhacking Hackers Who Dial "M" for Mayhem

Owing to a certain similarity between my telephone number and that of a local lumber company, I get more than my share of wrong numbers. I can almost count on my monthly ecstasy of a hot bath with lilac-scented bubbles and plastic battleship being interrupted by a dash to the ringing phone. Although bothersome, such calls are not worrisome.

The calls that do cause me concern, however, are the cases in which my "Hello?" greets dead silence. The seemingly dead line should worry anyone who leaves his modem connected and waiting to talk to the incoming computer conversations of friends and co-workers.

Certainly the quiet could be caused by something entirely innocuous, but the real worry is that the phantom caller could be digital. Behind the dead receiver may lurk the quiet anticipation of some unknown modem looking for the tones of a mate. Quite possibly this intruding modem may be under the control of some bored hacker—or worse, under the control of a program written by a bored hacker so he can remain bored while his computer does his meddling for him.

Baited Beeps

The hacker is fishing, trolling like a deep-sea angler in search of sport and the carrier tone of your modem. His fun—and your terror—begins when he makes contact. A simple program sends his modem scurrying through a telephone exchange, registering every number that a modem is attached to. Then, when the hacker is in a foul humor and wants to vent his spleen in any general direction, he can pry into your

computer and just type the magic command `DEL C:*` to send 10 megabytes of your hard work to oblivion.

Tones à la Mode

Your system is vulnerable to these phantom wrong callers because of the way modems work. In normal answer mode a modem that answers your phone line automatically sends out a carrier tone. The calling modem, in originate mode, sits quietly on the line until it hears the tone, giving no audible evidence it's there to a mere human being who might pick up the receiver.

The simplest way around the tone troller is just to give your modem a twist—have it answer the telephone in its toneless originate mode. The people authorized to call in—you or your employees—will know about the switcheroo and can set their dialing modems in reverse, to answer mode.

Although this strategy might sound somewhat oblique, it's a standard feature of some communications programs—*Crosstalk XVI* by Microstuf, for one.

A devious hacker can work around such camouflage by giving up part of his anonymity. He

simply needs to modify his tone-trolling program to make his modem first listen for a while and then switch into answer mode before hanging up on a toneless line. By squirting out a tone for a few seconds, he can latch hold of any not-quite-hidden modems.

Switch Hitting

You can better hide your modem using a DTMF (Dual-Tone, Multiple-Frequency, the generic term for Touch-Tone) activated switch, such as the TATS found in the Black Box Catalog. With a little basic electronics knowledge, you can rig the switch to answer your modem line automatically. It will then connect your modem to the line only after it receives the secret switching code—the sound of the proper key being pressed on a push-button telephone.

Better yet, borrow my personal strategy and make a single phone line do double-duty taking verbal messages or talking to modems. I've modified my answering machine with a home-made DTMF-activated switch, which is tied across the phone line.

Ordinarily I have an answer-



ing machine connected to the phone line. By keeping it set to its delayed-answer mode so that the phone must ring several times before the machine answers, I have the option of answering myself, if I'm home and temporarily in a friendly mood, or letting the machine do the talking.

Making Call-Backs

If the possibilities of modem abuse really have you worried, the ultimate strategy is to use a dial-back modem, a specialized hardware device that will answer the phone with a modem tone as if your computer were in control. However, the dial-back modem patiently waits for the caller to type in the appropriate password. It disconnects if he is not successful in three attempts. If the dial-back modem gets the right password, it hangs up anyway, but then it searches through its password list and matches the code word it received with the name and number of someone authorized to call.

The dial-back modem then dials the original caller back. Only then does the caller get access to the computer, and of course the modem duly logs who it has called so that if any funny stuff occurs, like a block of files getting erased or top-secret files disappearing, everyone knows who to blame for the damage.

If you really want to fight back at hackers, just connect your modem, set to answer mode, to your telephone line—but don't attach it to your computer! The hackers may go crazy trying to break into your system, and wrong numbers will get so careful of how they talk to you that you can rest easy.

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Black Box Catalog
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Waiting for WYSIWYG

Word processing programs are still feeling growing pains, and their users suffer with them. Some are page-oriented; others are document-oriented—why not both? And what's a WYSIWYG, anyway?

More PC Magazine readers rate themselves as proficient or power users of word processing programs than of any other category of software. We surveyed our readers and were impressed by how important they consider word processing. It stands to reason, though. The personal computer has had more of an impact on how we put words on paper than on any other applications area. Also, word processing is one of the fastest-changing application areas. The question is, can we users keep up with the new technology?

That's not just a journalist talking, either. Six or seven years ago, Vydec, Xerox, and Wang word processors ruled the office. Now corporations are ripping them out wholesale and replacing them with PCs. Sure, they're gaining the additional functionality of database and spreadsheet applications, but I've seen legal departments that have chucked their dedicated word processors to replace them with PCs, and they have no intention of doing anything but word processing.

This phenomenon is hardly unique. It makes perfect sense when you consider that word processing was about the only thing that early microcomputers could do right, other than games. Breakthrough programs such as *WordStar* put what-you-see-is-what-you-get (WYSIWYG, pronounced wizzywig) word processing within reach of everyone with a terminal and a CP/M computer. Prior to *WordStar*, everyone regarded personal computer screens as "glass teletypes," and most programs were tiresomely uninspired in their handling of the screen.

WordStar was a natural to transport to the PC, and it set a high-water mark for on-line help, fast processing of large documents, and powerful print formatting.

Yes, its WYSIWYG work was especially good, but it came under serious



Bill Machrone

criticism from business users for its complex and sometimes obtuse command syntax. When I was a consultant training people to use *WordStar*, I always asked myself which 40 percent of its functions they needed to learn. "Hard to learn, easy to use" is still everyone's favorite aphorism for the program; but I liken using *WordStar* to licking an ice cream scoop and having your tongue freeze to it: The pain is transitory and ultimately worthwhile.

The pain and pleasure of *WordStar* notwithstanding, the marketplace held plenty of room for alternatives. The first (and some of the best) programs to come

along imitated other products. *MultiMate* is a very successful adaptation of Wang word processing philosophy, while *XyWrite* started out imitating the ATEX typesetting system. The free rein that the PC gives designers lets them move far beyond the constraints of the systems they are copying. They can make radical improvements in performance and features.

Some of the new crop are document-oriented, and others are page-oriented. The original basis for this distinction was that secretaries are page-oriented and professionals are document-oriented. This oversimplification is responsible for extending the typewriter metaphor far beyond its use. Some word processor designers worked so hard at emulating a typewriter that they all but killed the utility of the product.

Users really need it all: line-by-line control over format, information on page breaks, and full-document freedom. Who can tolerate a product that loses its format when you move a block of text from one part of a document to another?

Clean Slate

On the other hand, the PC has been a clean slate for designers coming in with no preconceptions. *Microsoft Word* is one example of WYSIWYG taken to the limit. Oh, it doesn't scale fonts on-screen yet, and it doesn't display proportional faces, but just wait.

A new product called *Mind Reader* represents another direction. I'm undecided whether it's an innovation or a gimmick or both. It "listens" to your

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EDITOR'S SCREEN

keystrokes, and as soon as it sees a potential word, it puts a box up on the screen with ten words in it, ordered from the one it considers most likely to be the one you're typing to the least likely word. If the word you were going to type is up there, you strike the appropriate number key to complete it. *Mind Reader* learns new words and reorders its guesses according to your preferred vocabulary, dropping words you don't use and adding ones you do. It tells you your effective words per minute and the number of keystrokes you made versus the number of characters generated. The figures in both cases are truly impressive.

The quandary such a product as this brings is that learning to type with it requires an effort on the order of learning the Dvorak keyboard, or more appropriately, a stenographer's machine. It ruins your for regular typing. Despite the increased productivity, I wonder if the underlying technology wouldn't be better applied to an interactive spelling checker than a word-completion program. After all, IBM has that new generation of typewriters that beep discretely every time you type a word they don't recognize. But then, I may be an old fogey when it comes to keyboarding. By the time the rest of you are using voice input, I'll still be clacking away merrily on my keyboard.

New Direction

I've said for a long time that the color graphics screen is the future. And so it shall be. But mere color and mere graphics aren't going to do the job. I'm looking for a new class of software, more akin to electronic page composition than anything else around today. I want to lay my text down in columns and change type faces, sizes, and weights. I want graphics integrated with text. I still don't want sneakers in my memos, but I do want to create logos and diagrams. I also want to bit-map photographs into my text. I want to wrap text around the graphic elements. I don't want a bunch of dot commands or other tomfoolery telling my typesetter or laser printer what to do. I don't want to have to think about those details. After all, what do I have a computer for? Most of all, I don't want to have to think like a

programmer while I'm writing. I do, however, want learnable, model formats. I want my word processor to be able to look at a Pascal program, then use what it learns as a format guide for new

programs.

Am I page-oriented? Am I document-oriented? Guilty on both counts. What I'm asking for is to have my cake and eat it too—the ultimate in WYSIWYG. ■

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Multiple Card Decks	YES	YES	NO Files	YES
Number Cards Per Deck	RAM Limit	500 Max.	NO Files	500 Max.
Max. Characters Per Card	969	480	NO Files	480
Search	YES	YES	NO Files	YES
Auto Alphabetize	YES	YES	NO Files	YES
Print Card or Deck	YES	YES	NO Files	YES
CALENDAR				
Daily Notes	YES	NO	NO	NO
Mark Important Days	YES	NO	NO	NO
APPOINTMENT BOOKS				
Multiple Appt. Books	YES (1-10)	NO	NO	NO
"Things To Do" List	YES	YES	NO	NO
Print Appointment Book	YES	YES	YES	YES
ALARM CLOCK				
Display Time	YES	NO Alarms	YES	YES
Hourly Chimes	YES	NO Alarms	NO	NO
Display Alarm Message	YES	NO Alarms	NO	NO
Number of Alarms	9	NO Alarms	Many	Many
CALCULATOR				
On-Screen Tape	YES	NO	NO	NO
Printing Tape	YES	NO	NO	YES
Percentage Function	YES	NO	YES	YES
Display With Commas	YES	NO	NO	NO
Floating/Fixed Decimals	YES/Both	Fixed	Floating	Floating
Memory	YES	YES	YES	YES
Insert Result in Work	YES	YES	YES	YES
Max. Display Digits	15	18	12	12
Exponential Notation	YES	NO	NO	NO
* Binary/Hex/Octal	YES	YES	NO	NO
* ASCII TABLE				
YES	YES	YES	NO	NO
NOTEPAD				
Multiple Documents	YES (1-10)	NO	NO	NO
Word Wrap	YES	YES	YES	YES
Merge Files	YES	NO	NO	NO
Change Margins	YES	YES	NO	NO
Variable File Size	YES	YES	NO	NO
File Size Limit	64K	50K	4.4K	4.4K
Variable Window Size	YES	YES	NO	NO
* Search & Replace	YES	YES	NO	NO
* Block Moves	YES	YES	NO	NO
* Auto Indenting	YES	YES	NO	NO
* Page Break Display	YES	NO	YES	YES
* Insert or Overtyping Mode	YES	YES	YES	YES
* Cut Sheet Printing	YES	NO	YES	YES
Print Document	YES	YES	YES	YES
Print Window Only	YES	YES	YES	YES
Undelete Key(s)	YES	YES	YES	NO
KEYBOARD ENHANCER				
Number Keys Redefined	YES Up to 60	NO Macros	NO Macros	NO Macros
Total Keystrokes	YES 2500	NO Macros	NO Macros	NO Macros
* GRABBER				
Cut & Paste between applications	YES	Import Only	NO	NO
* DOS FUNCTIONS				
See copy	YES	NO	NO	NO
* AUTO DIALER				
YES	YES	YES	NO	NO
GENERAL CHARACTERISTICS				
100% Memory Resident	YES	NO	NO	NO
Minimum Memory Used	40,000	61,300	77,200	77,200
Typical Memory Used	50,000-75,000	61,300	77,200	77,200
On-Line Help	YES	YES	YES	YES
Movable Windows	YES	YES	NO	NO
Redefine Colors	YES	YES	YES	YES
Expandable/Add Functions	YES	NO	NO	NO
Can Remove Functions	YES	NO	NO	NO
Integrated Interface	Excellent	Good	Good	Good
Visual Appeal	Excellent	Fair	Poor	Poor
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COST - UNPROTECTED	\$84.95	\$84.95	NO/Not Avail.	NO/Not Avail.

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Letters to PC

Issues of Piracy

In Bruce Lewenstein's article "The Ethics of Software Piracy" (PC, Volume 4 Number 9), he discusses the effects that piracy has had on an author's royalties. In the article he writes, "None of the software is worth what we are paying for it," David Alpert told *Esquire* in 1982. Alpert is the developer of a program called *Locksmith* that lets users copy any program, even one that is copy protected. "Software should be subsidized by larger distribution," he said. "But the market doesn't exist yet, so we're paying for it by being pioneers."

None of the quotations attributed to me appeared in *Esquire* or anywhere else. Lewenstein implies that I believe that piracy was justified by the high cost of software. Nothing could be further from the truth. Even if I had said that software prices were too high, that would not mean I believed that one had the right to steal software.

Also, Mark Pump is the developer of *Locksmith*, and I owned the company that distributed it. I always promoted the program for its legitimate use—to make backup copies of software that users could not make using the manufacturer's supplied copy protection program.

Sure, there is a problem with piracy, but there is a problem with copy protection too (just ask anyone who has a hard disk drive). And there is a problem with the way it's all being reported. So when you do report on it, please do so with your facts verified.

David M. Alpert
Lake Forest, Illinois

Bruce Lewenstein replies:

Mr. Alpert is completely correct; I should have attributed the quotes to which he refers to a "mathematician who belongs to a San Francisco users group." I apologize to Alpert for any implication that he is either a pirate or supports piracy.

Alpert is also correct when he notes that both piracy and copy protection are problems. As I tried to show in my article, piracy is not something for which there is a "right" answer. Reasonable people can reasonably take quite different positions on piracy—which indicates that it touches on deeper issues and



raises subtle points that the PC community must address as it moves beyond its period of youthful exuberance.

You Could Use a Port Contender

In PC Tutor ("Communications Complexities," PC, Volume 4 Number 12), Harry Walker described a communications access problem involving multiple serial devices accessing a single PC. Although the problem description was sketchy, the discussion generally assumed that guaranteed simultaneous accessibility was required.

Many times a host system needs to be reasonably accessible but not necessarily instantly accessible. Sometimes the actual amount of traffic on the data lines is fairly low. If this is the case, a hardware device available from many data communications supply houses, known as a port contender, may provide a reliable and affordable solution to the problem. This "off-the-shelf" approach is certainly easier than worrying about hardware and software modifications that will jeopardize warranties and vendor support.

Raymond V. Kramer
Grosse Ile, Michigan

Modifications with ONEKEY

I found Steve Holzner's Programming column "Making Your Own Macros" very useful (PC, Volume 4 Number 9). ONEKEY worked very well from BASIC and with my applications programs.

I have written a modification for ONEKEY.BAS that you might like to share with other readers. It allows those of us who aren't perfect typists to recover from mistakes while entering commands. To modify your copy of ONEKEY.BAS, enter the following lines of code. The lines are numbered to fit into the program as it appeared in PC.

```
485 LOCATE 28,23:PRINT" (Use Control Home  
to redo command)."  
555 IF CODE1=8 AND CODE2=119 THEN J=188:  
GOSUB 1888:GOTO 438  
658 FOR EIO=11 TO 28:LOCATE EIO,15:PRINT  
SPC(78):NEXT EIO:NEXT I:DEF SEG  
1888 LOCATE 14,16:PRINT SPC(58):FOR J=1  
TO 188:COMMANDS(I,J)=8:NEXT J:RETURN
```

The use of Ctrl-Home will blank out the command line and reset the array, allowing you to reenter your last command. If you find that Ctrl-Home is not a good command sequence, you can change it by substituting different ASCII codes in line 555.

Peter Steeper
Alberta, Canada

Steve Holzner replies:

Indeed, this does work. If you mistype a command, one touch of Ctrl-Home will erase it and you can start again. While I welcome additions and fixes from readers, this one is actually not that necessary since the backspace key works in ONEKEY.BAS, and you can just erase whatever you mistyped.

PC Fills the Time

Being retired, I thought I would have a lot of idle time. But PC and my Compaq keep me busy for the two weeks between issues. I especially like Programming, User-to-User, and PC Tutor.

Douglas D. Raymond
Westbury, New York

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LETTERS TO PC

Nuclear Simulations

Thank you for the article by Stephanie Stallings, "Simulating Nuclear Accidents" (PC, Volume 4 Number 11). Computers are used extensively in nuclear power plants, in many facets of plant operation, and in real-time simulation. I look forward to any future articles you may have on the subject.

Since I am involved in the nuclear industry, I would like to point out some inconsistencies in the article. First, no plant in the world that I am aware of operates at pressures anywhere near 32,000 psi. The typical Boiling Water Reactor (BWR) that is simulated by Brookhaven's computers operates at a pressure of approximately 1,005-1,020 psig (pounds per square inch gauge). Many safety relief valves incorporated in the design start to open at about 1,075 psig, and all valves are open at 1,105 psig in the relief mode (they are electrically operated). These same valves also have a code safety setpoint (system pressure opens the valve against spring pressure), with all valves open at 1,205 psig. It is impossible to pressurize the system to 32,000 psi. The design pressure for these types of plants is typically 1,375 psig.

Secondly, when Dr. Mallen disabled the control rods from inserting into the core, the article stated that "the green pressure curve began to rise, causing the simulated pressure release valves to close." Those pressure release valves must open to relieve the overpressure condition, or failure of the reactor coolant system could result.

Finally, in the same scenario, "the neutron intensity of the core was unable to shut itself off" is misleading. The core does not shut itself off; control rods are provided for this purpose. If they fail to insert, a backup system is provided to inject a liquid containing boron into the core. Boron, which is also in the control rods, stops the fission process by absorbing neutrons, thereby shutting down the reactor.

Sandy Bergstein
Bloomsburg, Pennsylvania

Stephanie Stallings replies:
Sandy Bergstein is correct in pointing out that a psi of 32,000 is much too high.

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LETTERS TO PC

This was a misleading example. My point was that the dynamic range of the calculations used in the simulations is much greater than plus or minus 32,000, and these numbers must be scaled down to be less than 32,000 for use in the AD 10s. For instance, fission power, measured in watts, ranges up to ten to the ninth power.

Bergstein is also correct in saying that the simulated pressure-release valves would open, rather than close, to relieve the pressure.

On the third point, according to Dr. Wulff, if control rods fail to insert, the first backup is the generated water vapor. This replaces the liquid water in the core, thereby greatly reducing fission power. Later, boron is injected to shut down the reactor completely.

An Overworked Programmer

Please don't overwork Steve Holzner, but as fast as he can crank out his programs for your Programming column, I'll be entering them in on my PC. The programs are very practical.

Keep up the good work.

Patrick E. Finucane
Houston, Texas

You're sure keeping Holzner busy, but you can save time and typing by downloading many of his program listings as well as others from the PC-IRS bulletin board by calling (212) 696-0360.—Ed.

Spreading the Wealth

Two of my favorite sections of PC Magazine are "User-to-User" and "Spreadsheet Clinic." Each issue mentions very helpful hints that we then extend to others through our company's internal newsletter.

Emily L. Ottavi
Hartford, Connecticut

Quality Graphics Take Time

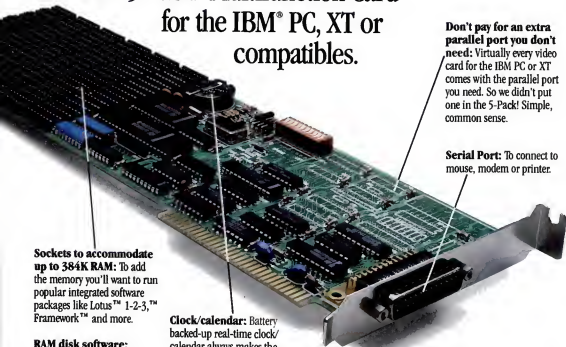
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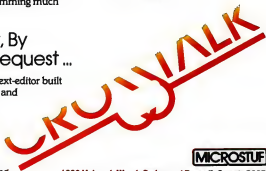
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LETTERS TO PC

from the fact that *CHART-MASTER* is written in compiled BASIC."

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Jonathan R. Siegel
DecisionResources, Inc.
Westport, Connecticut

Simple Conversion

Thank you for reviewing Management Science Associates' *Workload: The Loading Link in PC News* ("Learning and Earning with New Programs," Volume 4 Number 10, page 62).

Readers who want to know where they can obtain our software—which reformats ASCII files into spreadsheet files—can contact us at 5100 Centre Ave., Pittsburgh, PA 15232, (800) MSA-INFO.

Also, to correct an inaccuracy in the article, one of the six file formats that *Workload* automatically outputs is a CAL file for *SuperCalc3*. The WRK format is for the *Symphony* spreadsheet, not the graphics.

Carol Wharton Titus
MSA, Inc.
Pittsburgh, Pennsylvania

How to Write to PC

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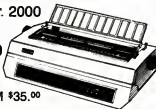
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When you're comparing database software, there are all kinds of things to think about. Ease of use. Power. Application development time.

Well, we think execution speed should be way up on your list, too. Because the last thing you need is a program that runs in slow motion.

That's why we've designed new R:base™ 5000 to outrun every other DBMS package available. For example, just look how it compares to dBASE III:

EXECUTION TIME BENCHMARKS:

R:base 5000 vs. dBASE III

Using an IBM PC XT, we ran a series of performance benchmarks comparing the speed of R:base 5000 to dBASE III. The functions performed were identical. The execution times were a different story.

Function	R:base 5000	dBASE III
SORT 1000 rows of 8 columns each on a dollar field by amount	26 seconds	65 seconds
SEARCH 1000 rows for unique number in non-keyed field.	7 seconds	14 seconds
REPORT with one lookup to a second table stored to a file	6 minutes, 49 seconds	11 minutes, 8 seconds
PRINT a report of sorted data with subtotals	6 minutes, 39 seconds	10 minutes, 30 seconds
TOTAL (All functions performed in sequence.)	14 minutes, 1 second	22 minutes, 57 seconds

R:BASE 5000. NOBODY OUTFRINS IT.

As you can see, for almost every important individual function, R:base 5000 is 60% to 150% faster than

dBASE III. But that's only part of the story. If you're performing a typical operation that calls for searching, sorting, reporting and printing, then R:base 5000 puts you more than 8 minutes ahead of dBASE III.

And we're just talking about the time you save on one report. As the years go by, you'll save that much a thousand times over. Since we also help you develop applications up to ten times faster, you'll be even farther ahead.

SEE FOR YOURSELF: 1-800-547-4000.

If you believe in common sense as much as we do, you won't buy something this important without trying it out first. And that's just what we'd like you to do. For only \$9.95 (plus shipping) we'll send you a mini-version of the product that lets you build real-life applications.

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R:BASE 5000 FROM MICRORIM

IT ALL COMES DOWN TO COMMON SENSE.

DISK WORLD! is proud to introduce the lowest-priced, LIFETIME-WARRANTY diskettes ever!

And they're BRAND NAME PRODUCT to boot!

5.25" SSDD → .79 ea. 5.25" DSD → .89 ea.

5.25" DSDD-HD → \$2.35 ea.

3.50" SSDD → \$2.25 ea. 3.50" DSDD → \$2.65 ea.

Based on multiples of 100 each.
Boxed in 10's with heavy-duty cardboard sleeves, user ID labels,
reinforced hubs (where appropriate) and write-protect tabs.

Introducing Wabash Pinnacle Series Diskettes.

Two years ago, if you'd told me I'd be writing this ad, I would have laughed.

At that time, Wabash diskettes were synonymous with "a-1".

Just saying that quality control was poor would be charitable.

So much was wrong that DISK WORLD wouldn't sell them.

That was yesterday.

Kearney-National Inc., a \$202-million division of a much larger company, came into Wabash.

Out went the old management, the old methods, the old production techniques... and in went a lot of new people, ideas, production lines and some really imaginative thinking.

The end result.

Today, I'm proud to offer you the Wabash Pinnacle Series of diskettes at the prices shown.

This isn't evolution in diskette manufacturing, it's revolution.

Here's what you get.

Wabash Pinnacle diskettes are

- certified 100% Error Free
- covered by a LIFETIME WARRANTY
- meet or exceed all industry specifications (by quite some distance)
- and are simply the best value in diskettes available today.

The torture test.

Considering Wabash's earlier dubious reputation, I wasn't exactly a true believer when their Director of Marketing came into my office with samples.

So I took a box at random, selected a disk, bent the thing every which way and slipped it into my IBM PC.

It formatted. It booted. It stored and retrieved data.

That wasn't enough.

I gave samples of the diskettes to Curt Rosenbach and, in turn, to Tom Street. Both backers of long experience and members of the Wabash (Illinois) Apple Users Group.

Tom really went all in.

He took a three-halogen lamp, aimed it at the diskette until it started to smoke (and melt), and then formatted, booted the diskette and stored and retrieved data.

The same terribly (and intentionally) mutilated diskette ran on an ITT, Corona and IBM.

He simply bent the diskette every which way... and it still formatted, booted and ran on his Apple.

The best buy I've ever seen.

DISK WORLD!, Inc. sells more flexible magnetic media by mail-order than anyone else in the world.

In fact, as President of the corporation, won't tolerate a product with a failure rate of more than 1/100,000 of 1 percent.

I also don't like companies who try to make a "quality" or "premium" image for a higher price like Dyan and Verbatim did... until they failed.

As President of DISK WORLD!, Inc., my motto is simple "The best diskette for the least amount of money."

Wabash is it.

Right now, there is no better value than the Wabash Pinnacle Series of diskettes.

Granted, you have to buy a hundred of a time, but so what? Split the order with friends, relatives, co-workers or even your worst enemies.

The only thing is to get the most diskette for the money. And this is it.

(Incidentally, as a corporation, we put our money where our



mouth is. Our first order for Wabash Pinnacle Diskettes was 1.5 million units!

That's an awful lot of faith and confidence.

But, then again, I have the diskette that Tom Street literally mailed... and kept on running.

The truth about \$1.00 or less diskettes.

More and more ads are popping up offering diskettes for \$1.00 or less.

By the same token, more and more people who were selling used cars a few months ago are now selling diskettes by mail.

We did a little survey of current ads for diskettes advertised for a dollar or less and did some analysis of the market and here's what we found as it applies to 5.25" DSDD diskettes "supposedly" selling for a dollar or less.

VENDOR:	ADVERTISED PRICE	ACTUAL PRICE	ACTUAL QUANTITY:
Unitech	89 ea	92 ea	Unspecified
Datamax	99 ea	99 ea	Unspecified
Computer Club	96 ea	98 ea	Unspecified
	99 ea	1.02 ea	Unspecified
Communications & Electronics	49 ea	65 ea	Unspecified
Precision Data	89 ea	93 ea	Unspecified
Diskette Connect	93 ea	93 ea	Unspecified
Comp Soft Serv.	77 ea	77 ea	Unspecified
		\$1.00	Unspecified
Computer/Computer	99 ea	99 ea	Unspecified
DISK WORLD!	89 ea	92 ea	Wabash Diskette

The real truth about \$1.00 or less diskettes.

It costs all diskette manufacturers about the same to produce a diskette. Some they charge more because they want to project a "premium quality" image, like the late, lamented Dyan who bought their basic model from 3M.

Some charge less because they sell a sub-standard product... and we're not foolish enough to name names here.

But here's the truth about the \$1.00 or less diskette market: it falls into four categories:

1. The DISK WORLD! of the universe who simply are so big that they can buy first quality product in massive quantities and choose to pass on the savings to you. (Precision Data and Quanta Collection on BRAND NAME products also fall into this category.)

2. The people who buy "cosmos"... stuff from major manufacturers that usually hits quality control standards, but is cosmetically blemished and thus can't be packaged and sold under the manufacturer's own name.

3. "Duplicate Quality". Uncertified media, usually below manufacturer's own standards and frequently below ANSI and IBM standards. Sold on an "as-is" basis with the understanding that the manufacturer's name will never be duplicated. Usually about a 20% reject rate, as compared to DISK WORLD!'s standard of less than 1/100,000 of 1% reject/return rate. Next to garbage, this is the source of most diskettes sold at a dollar or less.

They may work... and then again they may not. (Frankly, the odds at the Blackjack table in Las Vegas are more in your favor.)

4. Garbage. Stuff that shouldn't be sold at all. But some manufacturers are hurting for cash, so they sell it anyway. (After all, they want to meet their payroll. Look what happens when you don't: you become a Dyan or Verbatim. Lots of history, but no money.) More and more garbage is being dumped into the market as income becomes guaranteed for cash and as motivated into selling anything and everything they can manufacture. (Read the article in FORBES about Verbatim and its "bonus" brand.)

Finally, the Taiwanese counterfeiters are moving into the act. Perfect duplicates of the packaging of major manufacturers with one exception: the quality isn't there.

The Critical Factor.

Only DISK WORLD!, Inc. offers fully brand-identified, LIFETIME WARRANTY product for less than a dollar.

Every one else offering 5.25" product for less than a buck doesn't tell you who makes it.

We do.

And that ought to tell you a lot more than

Ordering & Shipping Instructions

SHIPPING: Wabash Pinnacle Diskettes are sold in multiples of 100 only. Shipping charges are \$3.00 per 100, regardless of type or size.

PAYMENT: VISA, MASTERCARD and PREPAID orders accepted. Corporations rated 342 or better and government and quasi-government open accounts are accepted on a NET 15 basis.

C.O.D. orders are subject to a \$5.00 special handling charge. (Sorry for the increase, but too many have been returning C.O.D. orders or using bad checks. It's a classic example of a few "bad eggs" making life more expensive for everyone else.)

APD, FPO, AK, HI & PR ORDERS: include shipping as shown and an additional 5% of the total amount of the order to cover P&H and insurance.

No other non-continental U.S. orders are accepted. TAXES: Illinois residents only add 7%.

All orders subject to acceptance. Not responsible for typographical errors.

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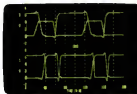
How many long unproductive hours have you spent "in line" for your simulation? Well, no more. MICROCAP and MICROLOGIC can put you on line by turning your PC into a productive and cost-effective engineering workstation.

Both of these sophisticated engineering tools provide you with quick and efficient solutions to your simulation problems. And here's how.

MICROCAP: Your Analog Solution

MICROCAP is an interactive analog circuit drawing and simulation system. It allows you to sketch a circuit diagram right on the CRT screen, then run an AC, DC, or Transient analysis. While providing you with libraries for defined models of bipolar and MOS devices, Opamps, transformers, diodes, and much more, MICROCAP also includes features not even found in SPICE.

MICROCAP II lets you be even more productive. As an advanced version, it employs sparse matrix techniques for faster simulation speed and larger net-

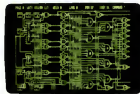


"Typical MICROCAP Transient Analysis"

works. In addition, you get even more advanced device models, worst case capabilities, temperature stepping, Fourier analysis, and macro capability.

MICROLOGIC: Your Digital Solution

MICROLOGIC provides you with a similar interactive drawing and analysis environment for digital work. Using standard PC hardware, you can create logic diagrams of up to 9 pages with each containing up to 200 gates. The system automatically creates the netlist required for a timing simulation and will handle networks of up to 1800 gates. It provides you with libraries for 36 user-defined basic gate types, 36 data channels of 256 bits each, 10 user-defined clock waveforms, and up to 50 macros in each network. MICROLOGIC produces high-resolution timing diagrams showing selected waveforms and associated delays, glitches, and spikes—just like the real thing.



"Typical MICROLOGIC Diagram"

Reviewers Love These Solutions

Regarding MICROCAP... "A highly recommended analog design program" (PC Tech Journal 3/84). "A valuable tool for circuit designers" (Personal Software Magazine 11/83).

Regarding MICROLOGIC... "An efficient design system that does what it is supposed to do at a reasonable price" (Byte 4/84).

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Software Makes the PC

Sure, the right hardware components are important, but if you don't have top-quality software, what good is the hardware? Norton gives his favorite software picks for Ye Perfekt PC Systeme.

Last issue, I discussed the ideal hardware set-up for Ye Perfekt PC Systeme—a system that can be put together by a sensible, working professional who uses his PC intensely and could afford anything that was needed—but doesn't want to waste any money on useless frills. Now, I will make a much harder set of recommendations: software for that perfect PC.

First, here are two of my major criteria for recommending software. One is a bias toward the major companies. I don't think it's wise to buy software from possible fly-by-night companies that might not be in business in a year or two. You invest heavily in learning to use a piece of software, and this investment may be blown if the software isn't supported in the future.

My other criterion for recommending software is based on how easy its commands and features are to remember. It's nice when a program is easy to learn, but what happens after you've learned it? If the program's commands are so complex that you quickly start forgetting them, then the program doesn't pass my ease-of-retention test. If you can come back to a program cold, after not using it for a while, and use it easily, then it's a worthwhile investment to make.

To Integrate or Not

The three major software tools (spreadsheets, databases, and word processors) either come in separate programs or combined in an integrated package, so the first question I want to address here is whether or not you should

buy integrated software. Most of us remember the spring and summer of 1984 when the emergence of big, integrated software had the PC community all atwitter and everyone was looking forward to the contest between *Symphony*



Peter Norton

and *Framework*. At the time, we all thought big integration was it. Now we're older and wiser.

The arguments against integration are that very few people have any real need for the full integration of the big-three functions, and if you go for integration, you have to look for the best of a narrow field of integrated products instead of a much wider choice of products for each separate function. But, a strong and often-overlooked case for integration also exists: Even if you don't need all those functions now, you might need them later. Let's say that you only need word processing and a coworker just requires a

database; if the work you two do isn't combined, each of you could use two unrelated, unintegrated programs, but think of the indirect benefits that come from each of you learning a common command structure in an integrated program.

In addition, if you master *Framework*'s spreadsheet commands, you're already halfway to knowing its database commands as well. I will admit that this isn't really an argument in favor of integration, it's an argument in favor of common command structures, which makes things like the unified but unintegrated *PFS* series look attractive.

I personally think that the benefits of integrated programs aren't widely recognized because you have to take the long-term view to see many of them. But I'd also have to say that real-world experience with PCs doesn't necessarily support integration as the best solution.

Rave Reviews

If you do opt for integration, I think the clear choice is *Framework*. That's been pretty well established from all the reviews of *Framework* versus *Symphony* last year (see "Symphony Versus Framework: The Applications Face-Off," *PC*, Volume 3 Number 24), and it's also confirmed by analytical reviews in *Software Digest*: from a field of 15 programs, *Software Digest* rates *Framework* first and *Symphony* fourth (the others shouldn't even be considered based on my play-the-majors rule). *Framework* especially wins my vote on the basis of my ease-of-retention rule because once you have learned the program, you'll always be

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proficient at it.

If you don't want to go for integration, then you have to consider the field in each major area. There isn't enough room here for in-depth analysis, but I'll

give you my favorite picks with a handful of comments.

• **Spreadsheets.** Is there any question? 1-2-3 is so clearly the best that a comment is hardly worthwhile. The new

Above Board memory expansion and 1-2-3 Version 2 only put this program further ahead of the pack. I used to think 1-2-3 was an early attempt at an integrated product; now I know that 1-2-3 was just supplying the missing pieces in a really complete spreadsheet.

• **Database.** If you want to go for the all-stops-out best, then Cosmo's *Revelation* appears the clear winner. But it's just too much for most folks—including too much of another operating system. By ordinary criteria, *Rbase 5000* looks like the best database with *dBASE III* a reasonable second choice.

• **Word Processing.** Clear choices are harder to come by in this category. For example, *Software Digest's* two top-rated programs are both rated bad in "versatility" (that is, features or power). If power and rich features are what you are after, Microsoft's *Word* seems the clear winner, particularly because of its strong support of high-powered printers and mind-boggling richness in text formatting. Offhand, I'd have to say my short list of choices for word processors includes *PFS:Write* (also known as the *IBM Writing Assistant*) for simplicity and ease of use; *MultiMate* for popularity and to thumb your nose at An Wang (whose word processing computers *MultiMate* mimics); and Microsoft's *Word* for functional power.

The Top Utility Picks

Now, let's consider the little stuff, the miscellaneous utility programs that help you get things done. I would say that every system should have these six essential categories of small programs: Paths, Pops, Keys, Management, Recovery, and Spelling. If you haven't equipped your computer with programs in all six areas, you're negligent.

The Paths category includes programs that do for data files what the DOS PATH command does for program files—it lets you find data files no matter what disk directory they're on. Luckily, a lot of these programs are available, but the wise choice is clearly IBM's *File Facility*. It's got good features and a cheap price tag (\$20, from IBM-Direct, (800) IBM-PCSW).

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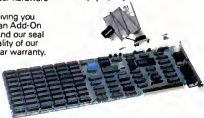
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calendar, and so forth programs. Borland's *SideKick* pioneered the idea, and I'd recommend this program as the best choice in a side field. (For product information, contact Borland International, 4113 Scotts Valley Dr., Scotts Valley, CA 95066, (408) 438-8400.)

Keys, of course, are keyboard macro programs. Of the two leading contenders, I think the choice is easy to make based on the one feature that each has over the other. RoseSoft's *ProKey* (RoseSoft, 4710 University Way, #601, Seattle, WA 98105, (206) 524-2350) was for a long time the industry standard, and Version 4 has a whole-key word feature (not just single-key macros); Borland's *SuperKey* has file encryption. If you can choose between these two features, you've chosen your keyboard macro program.

Management refers to a hodgepodge of programs that help you deal with the complexities of having a lot of files and directories on your disks. For the most part, the programs in this category aren't competing with each other but are providing different varieties of disk-management services. Here are my three favorites: *IDIR* from Bourbaki (P.O. Box 2867, Boise, ID 83701 (208) 342-5849; \$95), which is what I call a cockpit command shell; *Dirac-Tree* (Micro-Z Co., #4 Santa Bella Rd., P.O. Box 2426, Rolling Hills Estate, CA 90274, (213) 377-1640; \$49.50), which helps enormously in waltzing through directory trees; and, of course, my own *Norton Utilities*, which do a bunch of disk management chores.

Recovery programs get back lost data. My *Norton Utilities* set pretty much owns this category. For more technically oriented data-recovery tools than mine, I would suggest IBM's *Professional Debug Facility*.

Spelling programs are, of course, spelling checkers. If you have any sense at all, you already have a spelling checker built into your word processor (you really shouldn't consider a word processor that doesn't include one). But you should also have a freestanding spelling checker for miscellaneous use. The clear choice here is IBM's *Word Proof II* (\$40).

As I remarked before, if you don't

have your computer equipped with proper programs to cover all six of these utility categories, you don't have your computer fully configured as a working tool.

One final type of software is Environ-

ments. But if you're thinking of buying TopView, MS-Windows, Gem, Desq, or any others, think again. This is not the year to inflict an environment on yourself. ■

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The Gigabyte Age

CD ROM disks forge a new frontier in mass storage for PCs. But underneath the awesome data storage, they still have a lot in common with their audio-disk ancestors.

Get ready: The Gigabyte Age of personal computing is just beginning. Optical storage disks that can hold a gigabyte—that's a billion bytes—will soon be available for PC users. Even the new inexpensive CD ROM optical disks can hold around 550 megabytes of information. But all told, that's still only a little more than half a gigabyte.

So now, instead of thinking about data in terms of single megabytes, you have to consider data in thousand-megabyte chunks. And whether you choose to think of a gigabyte as a thousand megabytes, a million kilobytes, or a billion bytes, it is simply a lot of data.

To store this huge chunk of information you'd need a stack of 2,777 360K floppy disks or 833 1.2-megabyte floppies. With a 1200-baud modem, you would have to transmit data at 120 cps 24 hours a day for over 3 months to move a gigabyte.

Optical Storage

Go to your local record store and look at the compact audio disks. Selling for just \$15, these read-only optical disks already hold over half a gigabyte of data each.

Optical disks store data as tiny spots on a reflective surface, each spot representing a binary 1 or 0. Depending on the specific technology, the spots are either lighter or darker in contrast to the unmodified disk surface. To read the data, light from a laser is bounced off the rotating disk and reflected back to a photodetector that measures the brightness and determines whether a light or dark spot just zipped by.

Not all types of optical disks can be written to as well as read from. Erasable

optical disks, sometimes called "write-many," can both be read from and written to. Somewhat less versatile are the "write-once" disks that can be written to—but not erased—as well as have data read from them. Finally, "read-only" disks contain



Ron Jeffries

pre-recorded data and can't be written to.

Raymond Freeman of Freeman Associates in Santa Barbara, California is a noted optical disk technology observer. He says erasable optical data disks exist in research labs, but they may not be widely available for several years. At present, it isn't clear whether erasable disks will ever be widely used, though a great deal of research has been focused in this area.

As of mid-1985, read-only optical data disks, like the recently announced CD ROM disks, are becoming available for use with personal computers. The considerably more complex write-once disks are starting to appear in small quantities and

should begin shipment in volume over the next 6 months to a year.

Optical data disks as computer storage devices promise to be a big business. Freeman points to 1986 as the year sales take off; he predicts shipments of over 130,000 units. By 1990, he expects world-wide shipments of optical data drives to exceed 2.3 million units.

Will optical data storage replace magnetic disks? According to Freeman, it isn't likely. Because the two media perform so differently, optical storage will generally be used to complement rather than replace magnetic media. Magnetic disks offer fast random access, transfer data quickly, and are erasable. Optical disks have greater capacity, but slower random access, transfer data moderately fast, cost much less per data bit stored, and are removable. The nature of optical disks makes them best suited for applications that require access to large amounts of data but don't involve a lot of random access to individual records.

The Birth of CD ROM

The new CD ROM disks are a direct result of developments in audio technology. Digital recording reproduces sound with much better fidelity than that of conventional analog equipment. The problem with digital audio is that an incredible amount of data is involved. High-quality digital music requires about 44,000 samples per second for each channel of stereo. With 16-bits of resolution for each sample, a single minute of stereo music generates over 10 megabytes of data.

Sony and Philips solved the problem by designing the compact disk digital audio

QUANTUM LEAP

system, introduced in 1980. Since the compact disk stores music in digital form, it was an obvious candidate for use with computers. Under the CD ROM name, several companies have recently adopted

the mass-produced audio disk for computer data storage.

Both audio compact disks and CD ROMs use a 4.7-inch-diameter plastic disk. Data is represented as tiny "pits"

embossed in a reflective layer. A continuous spiral of pits unwinds from the center of the removable platter out to the edge. Successive layers of this spiral track of pits are only 1.6 microns apart. The pits themselves are about 0.5 microns wide and are between 0.9 to 3.3 microns long. The length of the pits varies because of the data-encoding method, called "8-to-14 modulation," which increases effective bit density and makes the data self-clocking. The spiral data track is divided into individually addressable blocks, each holding 2,048 bytes of user data on a CD ROM.

The transition from audio to computer data storage was not problem free. Small imperfections on the compact disk such as specks of dust or scratches can cause data errors. With music, simple error detection procedures that briefly continue the most recently played note are sufficient. Since 44,000 data points comprise one second of music for each stereo channel, it is possible to artificially fill-in slight interruptions with results so good that you can't tell the difference.

Unfortunately, computers are much more demanding: either all the numbers are there, or they're not. The CD ROM disk solves the problem by using a powerful error-correction technique: it stores 288 bytes of error-correcting information for every 2K of user data. The error correction gives CD ROMs a corrected bit error rate of 10^{-12} , which is competitive with Winchester magnetic disks.

ROM History

The consumer electronics heritage of the CD ROM disk is unusual. Previous mass-storage devices, like the Winchester, slowly trickled down from mainframes to micros. Since CD ROM technology came from the mass-market digital audio disks, their initial prices are much lower than they otherwise would be.

To produce CD ROMs, extra electronics were added to handle the increased error correction and to provide an interface to the computer. But the same assembly lines that crank out compact audio disks by the millions can be used to build CD ROMs, with only a few extra circuits added to the standard audio unit. Eventually, the added electronics will be put in VLSI chips and should add little to the cost of the

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system. The first complete CD ROM system announced early this summer costs \$1,600 with a controller for the PC and required software. As the volume of sales increases, CD ROMs should command even

less of a premium over the \$400 price of today's consumer audio disk players.

The removable-disk media used by CD ROMs are also inexpensive to manufacture since they are made on the same pro-

duction lines as the mass-produced digital audio disks. CD ROM disk media are identical to that used for music and are even formatted identically. The only difference between the two disks is how the data is processed before creating a master disk. Once the plastic platters are stamped out (a process similar to the way conventional records are made), CD ROM data disks are no different from the latest rock album.

It's too early to know what CD ROM data disks will eventually cost. Digital audio disks sell for about \$15, but each title may sell a few hundred thousand copies. It will be some time before we see the first "hit" CD ROM disk for computers produced in anywhere near that volume. Once you have data (or programs) ready to publish, the so-called "mastering costs" are moderate. Reference Technology in Boulder, Colorado charges a flat \$8,000 fee, plus \$250 for each reel of magnetic tape after the first. In quantities of 1 to 1,000, they charge \$15 per disk. For 1,000 disks, the entire process costs \$24 per disk.

CD ROMs will work best for large databases that don't change frequently. If only a limited portion of a database changes often, it would be practical to combine CD ROM technology with other types of storage. For example, a CD ROM version could be published once a year, with monthly or quarterly supplements made available via modem, on floppy disk, or in printed form.

In a future column, I'll discuss uses for this new way of publishing information and what impact it may have on our lives. A few of the more-obvious candidates for CD ROM applications include legal literature, parts catalogs, historical stock market listings and other financial and economic data, and indexes. Hundreds of regular books or the text (but not the pictures) of an entire encyclopedia could be put on a single disk.

Will all this new computer-searchable information make life easier? Maybe, but as Freeman notes, we are already swamped by information. As he puts it: "If you only need to brush your teeth, a fire hydrant isn't any better than a faucet."

Ron Jeffries is the editor of The Jeffries Report, a newsletter on personal computing published in Santa Barbara, California.

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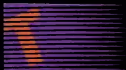
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CIRCLE 118 ON READER SERVICE CARD

The Republic of Technology

What's newer than nouvelle cuisine? Digital dining. What's older than the Constitution? The almost uniquely American pursuit of All Things New and Improved.

One of my favorite hangouts is a sleek, classy restaurant in Palo Alto, California called MacArthur Park. Housed in a beautiful old wooden building just across the street from Stanford University, it's a popular spot for the engineers, scientists, and businessmen of Silicon Valley. Hewlett-Packard's headquarters are only a few miles away; so are the offices of Varian Associates, the Stanford Research Institute, and many other high-tech firms and research centers. At MacArthur Park, where the crowds on a busy Friday evening spill out from the main hall to the sun-dappled patio, the talk often turns to the latest developments in computer technology. And in the past few weeks much of that talk has centered on a new technological morsel that has been installed in MacArthur Park itself.

The restaurant is the first test site for a *point-of-origin* computer system invented by Validec Inc. in nearby San Carlos. Instead of writing a diner's order on a pad—as waiters have been doing for a hundred years, if not longer—MacArthur Park's staff now key their orders into wireless, handheld computer terminals. The terminals, which resemble pocket calculators, transmit the orders to a central antenna, which in turn relays them to an IBM PC in a back room. Acting as a sort of culinary traffic dispatcher, the PC routes the orders to either of two small, noiseless printers, one in the kitchen, the other at the bar. When the food (or drink) is ready, the cook (or bartender) dispatches a message to the appropriate terminal, and the waiter fetches the order.

The system has many advantages. Be-

cause MacArthur Park is a big place, with room for four hundred diners on two floors, many of the tables are a good distance from the kitchen. Thanks to Validec, waiters no longer have to hike to the kitchen to place an order. They can spend more



Stan Augarten

time near their tables, catering to their customers' needs; they can pick up the food when it's done, not 10 minutes later; and they don't have to tote up the bills—the computer does it for them, giving each table a neatly printed, itemized receipt. And because the system comes with a comprehensive software package, management can obtain a detailed financial picture of the restaurant's operation at any time. One program, for example, gauges the popularity of each item on the menu; another measures the productivity of every waiter in terms of receipts and customers served. Most importantly, though, is what the system has done to the service. It's made it

faster and more efficient.

This was achieved in part because the Validec system is an improvement in existing technology. Although handheld terminals have been around for several years, most of them require protruding antennae and Federal Communication Commission (FCC) licenses. But Validec's terminals, which were designed with restaurants in mind, operate at radio frequencies that are too low to interfere with other broadcasts. So they don't require FCC certificates and don't need external antennae.

When I first saw the Validec system, I was fascinated by it, and I asked the nearest waiter for an explanation and a demonstration. But my second, and more considered, reaction was quite different. It seemed to me that the system was a frivolous waste of money and a crass intrusion into the peace and elegance of my dinner—another high-tech hustler has found a way to make a buck. (With millions of people starving all over the world, couldn't we put our resources to better use?) But I sat down, ordered my meal, and watched the waiters at work. I soon noticed that service was better—not substantially, since MacArthur Park has always been well run, but significantly. By the time my meal was over, I was won over by Validec's utility and originality. And I suspect that my reaction to the system, that pattern of curiosity, doubt and final acceptance, was shared by many other diners.

Better Living Through Validec

By the time this column goes to press, Validec will have been introduced to the

restaurant industry at a trade fair in Chicago. Based on the system's inherent advantages, the success of the test at MacArthur Park, and the interest that Validec has sparked among restaurant owners and the general public, I'll wager that most big restaurants in the United States will be using it, or one like it, within 10 years. And I'd be surprised if Validec didn't make substantial headway abroad as well—even though no other nation, with the exception of Japan, welcomes new technology as enthusiastically as the United States. For Americans don't regard technology as simply an array of tools for better living; rather, we look upon it as a linchpin of national prosperity and happiness.

It isn't a historical accident that the Validec system was invented in the United States. Of course, many countries possess the technical skill and financial resources to create a point-of-origin network like Validec; but the development of such a system presupposes an attitude toward society and technology that most of the world lacks (again, with the possible exception of Japan). Most Americans have little or no respect for the existing way of doing things; they question every institution, every tradition, every procedure, every rule, and habitually try to come up with better ways of doing things. However obvious the idea behind Validec may seem to us now, and however more obvious it will seem 10 years hence, when the system is commonplace, the very notion of substituting high-technology for a waiter's pen and pad is strikingly bold and original. Yet what can be simpler, less expensive and more efficient than writing orders on paper? The conviction that there must be a better way could only have germinated and grown in a country that welcomes innovation at almost any price.

As Americans, living in a land with an unquenchable thirst for new technology, we're not always fully aware of the attitudes underlying our technological developments. But those attitudes help make us what we are, and it's worth stating the more important of them. Most of us prefer

- the new to the old, the unconventional to the conventional
- the fast to the slow, the efficient to the inefficient
- the practical to the philosophical, the

concrete to the abstract

- the profitable to the unprofitable, the less expensive to the more expensive
- the machine to the human, the mechanical to the biological

Taken together, these attitudes constitute a social prescription for endless technological progress—a prescription that has prevailed since the early years of our republic.

Except for a few short-lived periods, such as the 1960s, we have always embraced new technology unreservedly. Most Americans, wrote Alexis de Tocqueville in *Democracy in America* (1835–1840), "are extremely eager in the pursuit of immediate material pleasures and are always discontented with the position they occupy and always free to leave it. They think about nothing but ways of changing their lot and bettering it. For people in this frame of mind every way of getting wealth more quickly, every machine which lessens work, every means of diminishing the costs of production, every invention which makes pleasures easier or greater, seems the most magnificent accomplishment of the human mind. It is chiefly from this line of approach that democratic peoples come to study sciences, to understand them, and to value them."

Hail, Caesar

Caesar Villano, the fifty-year-old businessman who conceived of the Validec system, was motivated by a similar line of approach. A short, stocky, grey-haired man, an Italian immigrant who came to the United States in 1960, Villano is a highly experienced restaurant executive. He worked for Price Waterhouse, the accounting firm, for many years; was chief financial officer of a West Coast restaurant company (the Rusty Scupper chain); and wrote a popular textbook on restaurant management and control. The idea for the Validec system occurred to him in the late 1970s, while he was working on his book.

"I realized that the restaurant operation has been the same for a hundred years," he told me. "Productivity was static. I wanted to bring restaurant technology into the twenty-first century without offending either the diner or the server. As soon as the IBM PC came out in 1981, I knew the time

was right to go ahead; computer technology was no longer intimidating to the businessman."

Villano wrote a business plan and went shopping for venture capital. At first, every financier he approached—he contacted ten venture capital firms altogether—turned him down. They simply failed to understand his intentions; although his system was designed for big restaurants, which rarely fail, they were put off by the restaurant industry's traditionally high bankruptcy rate. Although, as Villano pointed out again and again, small restaurants—by no means Validec's market—accounted for most of the bankruptcies, the financiers remained leery. Some of them even doubted the system's technical feasibility. Three firms finally offered to support him, but they wanted an arm and a leg for their help. Villano chose to dip into his own savings and finance the initial development himself. He managed to secure outside funds only after his engineers had fashioned a prototype and he had spent several hundred thousand dollars of his own money.

That Villano traveled a rocky road doesn't mean that America's faith in technology isn't deep and well-nigh universal. Every inventor encounters difficulties at one time or another; few people, even such clever, well-schooled men and women as the venture capitalists of Silicon Valley, possess the foresight to recognize a sure thing when it's only an idea on paper. What's more to the point is Villano's success; despite the roadblocks, he managed to bring his idea to life and to establish his own company, a firm whose product promises to revolutionize the restaurant industry. A smart and persistent businessman, Villano is hardly a visionary, but he's typical of the entrepreneurs who have brought computer technology into almost every nook and cranny of our lives. They certainly couldn't have done it, however, without us—all of us. ■

Stan Augarten is the author of *Bit by Bit: An Illustrated History of Computers (Tickner & Fields, 1984)* and *State of the Art: A Photographic History of the Integrated Circuit (Tickner & Fields, 1983)*. He also is a lecturer in computer history at Stanford University.

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WORD PROCESSING:

Eighteen popular word processors get a thorough workout as PC

In the 4 years since the PC's birth, 389 word processors have been released for it—that's nearly one per week. Of course many of these programs have since disappeared from the market (some the week they were introduced), sunk by poor design, distribution, or marketing and lack of reliable, state-of-the-art updates. The struggle for survival of the fittest isn't over yet.

To give you an edge in this War of the Words, *PC Magazine* is updating its sur-

vey of the word processing market (see Volume 3 Number 17). This new survey compares 100 features of 18 word processors in their most current versions. General popularity determined program selection, although several were excluded because they have not been revised since *PC* last reviewed them.

PC's editors picked nine word processing tasks that make up a typical working day at the keyboard and asked me and four other testers to put the programs through their paces. The first task was booting the program from DOS and bringing up a directory of drive B: that contained the two sample ASCII files—the introduction and first chapter of *The Hitchhiker's Guide to*

the Galaxy by Douglas Adams. (We wanted to have some fun on this project, too.)

The second task, begun from the main menu or writing screen, was to retrieve the first file, the introduction. Next came some editing using the search-and-replace function to correct 15 words and phrases. Some were lowercase, some uppercase, and some mixed; some were followed directly by punctuation, and one continued past a line break.

The fourth task was a block move in the second file that restores Adams's first paragraph to its place after it had been moved to the end. Once both files were corrected, we merged the second



THE LATEST WORD

Magazine puts them through a series of rigorous benchmarks.

file at the end of the first, creating a single file. In one program, this fifth task could only be performed by exiting to DOS and using its merge feature.

The file was still unformatted, and so the sixth task was to set a left margin of 10, a right margin of 70, and an initial line indent of 15 spaces for every paragraph. This task should be quick and easy, but very few programs performed satisfactorily. One took more than 10 minutes, and another required almost 500 keystrokes! (See the benchmark charts for an explanation of the keystroke tally methods.)

All the programs we tested can import and export standard ASCII files, but we wanted to know just how "stan-

dard" these files looked to DOS and other word processors. So the seventh task was to print the formatted file to disk, and the eighth was to output it to a printer. Obviously, on identical printers the printing itself should take the same amount of time; with this in mind, we measured the time and keystrokes up to the point when the first character appeared on paper.

The ninth task was the last one for the day. With the recently printed file open and on-screen, testers stored the work and exited to the DOS prompt.

In addition to the reviews, this package includes both tables comparing features and bar charts of the test results. The tables omit only the features common to all or nearly all of the packages. For instance, virtually all of the programs we reviewed can run from a hard disk, cen-

ter text, control the margins and paper size, search for or search for and replace a word or phrase locally or globally, copy and move blocks of text, use files from any disk drive, import and export ASCII files, suppress page numbers, and underline and boldface text. Any exceptions to these basic capabilities are noted in the reviews.

Here, then, without further ado, is a task-by-task analysis and review of each word processor.



WordStar Professional

WordStar Professional is a complete word processing package designed for the serious writer. It has all the necessary features to tackle any job and now comes with *CorrectStar*, *StarIndex*, and *MailMerge*. But the program was designed many years ago when personal computer keyboards didn't have function keys, so it is almost entirely dependent on control keys. Somehow, this classic word processor doesn't feel right on the PC. MicroPro has done some redesign work that resulted in a menu at the bottom of the screen for the ten function keys, but WordStar still takes little advantage of the PC keyboard.

WordStar is designed around an opening menu, a main menu, and five sub-menus, leading you to believe WordStar is a menu-driven package. It isn't really, because the menus are meant to be turned off as you learn the commands in order to gain more space for text on the writing screen. Thus, it is only menu-driven while you learn it, a nice feature that more programs should include.

On the nine benchmark tasks, WordStar Professional gave perhaps the smoothest performance of any program except *XyWrite II-Plus* and *Texta*, consistently taking less time and fewer keystrokes than most of the other programs. In the first task, booting from the floppy to a directory of drive B:, WordStar was clear-

ly the winner. From WordStar's opening menu, it takes just a few keystrokes to bring up a directory of files from any drive. WordStar retrieved the ASCII file for task 2 with good speed and no problems.

The search-and-replace task was another easy job for WordStar. Ctrl-Q takes you to the Quick menu, then typing A brings up the prompts for the words. The cursor is left at the bottom of the file after the search, but WordStar's backward search capabilities make up for this.

WordStar took longer than every other program to perform the block-move task, but that isn't surprising. The program has all the block operations you could want, but they require lots of keystrokes. You must position the cursor at the beginning of the block, call up the block menu, mark the position, move to the end of the block, call up the block menu again, mark the end of the block, reposition the cursor where you want the text moved, call up the block menu a third time, and finally perform the move. Seasoned WordStar veterans probably don't even think about all those keystrokes, but it bothers the rest of us.

For the task of merging the first chapter of text onto the end of the introduction, WordStar shone again, coming in third only to *XyWrite* and (surprisingly) *PFS:Write*. All you do is position the cursor, go to the block menu, and read in a file.

Reformatting the file for the sixth task is fast in WordStar but may be tricky. You can only insert paragraph indents using the search-and-replace function. Margins can

either be set through the on-screen menu or by pressing the appropriate function key—there is one for right- and left-margin settings. Still, WordStar would benefit greatly from automatic paragraph reformatting. It is semi-automatic: Ctrl-QB reformats all paragraphs.

WordStar's good print menu facilitated printing to disk and outputting to printer, but everything is printed from the disk, which is slower than printing from memory. Strangely, WordStar does not support print queuing, and it does not print multiple copies.

These gripes aside, the timed tasks attested to WordStar's power, and the results were generally impressive. However, WordStar no longer hogs the limelight of word processing; it is not among the top packages for the PC. One final note: Only WordStar and WordStar 2000 have telecommunications built-in.

FACT FILE



WordStar Professional 3.31
MicroPro International Corp.
33 San Pablo Avenue
San Rafael, CA 94903
(415) 499-1200
List Price: \$495
Requires: 192K RAM (with
SpellStar), DOS 1.1 or later, one
disk drive.

CIRCLE 649 ON READER SERVICE CARD



WordStar Professional

WordStar Professional is one of the few programs that use nonmnemonic menus and codes to denote special features like underlining. The function key menu at the bottom shows the extent of MicroPro's redesign for the PC.

WordStar 2000

If you like the power and flexibility of WordStar but find its menu structure obscure and complicated, take a look at WordStar 2000. It is a capable word processor that borrows the best and ignores the worst from WordStar. Command menus have been cleaned up and reorganized, and most commands no longer require the Ctrl key. More cursor-movement controls were added. You can print multiple copies and use proportional spacing. And the mysterious dot-command functions have been replaced with easier formatting commands. The biggest difference in editing with WordStar 2000 compared to WordStar, however, is auto-

TASK 1

Boot from DOS and bring up a directory on drive B:



We measured elapsed time from the A: system prompt until all files on drive B: were listed on screen. All keystrokes were counted, including those for the filenames.

matic paragraph reformatting.

However, speed was sacrificed for these gains. As the task scores prove, *WordStar 2000* is consistently slower than *WordStar*, although it uses fewer keystrokes to accomplish most tasks. The key-

in decent time, nearly a third faster than the average program, owing in part to its method of selecting a file from the directory list: You point the cursor and press Enter. We were impressed with this feature very much. It would make a nice industry

the replacement, but the result was "DougLAS adams"; the placement of the capital letters followed that of the original name. We were unable to find a way to correct the problem.

Block moves with *WordStar 2000* are similar to the original *WordStar*, but require much less time and far fewer keystrokes, partly because the new program can move the cursor by paragraph. Merging the two files for the fifth task was simple, and *WordStar 2000* shaved 10 seconds from the time of the average program.

Although 2000 took a little longer than *WordStar* to reformat the margin changes and paragraph indents, it was much easier. You get left and right margins and tab stops on the ruler line at the top of the document. The settings effect their changes instantly. Paragraphs rewrite themselves to fit the new settings and are reformatted automatically. We were willing to sacrifice some speed for this convenience. Another formatting convenience of the program is the addition of a style sheet that you can attach to documents as they are created.

Printing is simple with *WordStar 2000*. Your first choice is between printing to disk or outputting to printer, which made the seventh task a snap. Still, 3 minutes to write a file to disk is ridiculous, even when you consider all the special control characters the program must strip out.

The file-storing menu has a variety of options including saving and resuming work, saving and exiting, or abandoning the file built into the menu. But, once again, in the last task, *WordStar 2000* fin-



WordStar 2000

In contrast to its percentage, *WordStar 2000* uses clean, mnemonic menus. It also displays bold-face and underlining on screen. You set tabs and margins on the ruler line, which you can insert anywhere you wish to make a change.

strokes for booting to a directory of drive B:, for example, are nearly identical with both programs, but it takes a full 40 seconds longer with *WordStar 2000*.

The opening menu is a breath of fresh air, with 12 clearly defined choices that you select mnemonically. The spacebar brings up four less-common choices: Tel-Merge, MailList, Conversion for *WordStar* documents, and Indexing. Pressing D on the opening menu brings up a directory of the default drive and allows you to change the default. This directory appears below the menu, which facilitates any kind of file work.

WordStar 2000 loaded our ASCII file

standard.

The program gave its worst performance on the third task, searching and replacing, but don't misunderstand the data—it is exceptionally easy to perform a search and replace with *WordStar 2000*, but the function works slowly. From the nine-function editing menu, you select Locate and then you are prompted for the word or phrase. It then prompts you for a replacement word if you have one, and finally the program presents you with its full list of options for the search. We did encounter an odd little bug during this task. One sample replacement was Douglas Adams for Phil Wiswell. The program made

ished with the end of the pack.

Nonetheless, the program is full-featured, neatly designed, and easy to learn with its complete screen and manual tutorials. Its speed is the only major drawback, but this sloth, an anathema in an office, likely won't matter to the home user.

FACT FILE



WordStar 2000 1.01
MicroPro International Corp.
33 San Pablo Avenue
San Rafael, CA 94903
(415) 499-1200
List Price: \$495
Requires: 256K RAM, DOS 2.0
or later, two disk drives.

CIRCLE 648 ON READER SERVICE CARD

XyWrite II-Plus

XyWrite is a purely command-driven system without a menu to its name. In fact, XyWrite's writing screen, blank except for the command line, message line, and ruler across the top, is the only screen used by the program. Even the help screens that appear over your document are simply text files. This single-screen approach is refreshing as long as you don't mind memorizing commands.

A single key toggles your cursor between the command line and your text. All XyWrite functions can be executed from this command line, though a good number are also available with function or control keys. If you don't like the arrangement of function keys, XyWrite lets you change them. Most powerful word processors have a macro facility for setting up keystroke commands, but XyWrite goes a step further by providing a word processing command language along with a user-definable keyboard table. You can redo the entire keyboard if you wish, using the two-letter abbreviated commands to place functions or macros anywhere—on the function keys, Alt, Ctrl, and so on. Want the Dvorak keyboard layout? No problem with XyWrite. Just reassign the keys and switch the keycaps.

XyWrite has lots of other unusual features, such as writing directly to the

screen. When you page up or down and jump to the end or beginning of your document, the move is instant. In fact, you can page up or down as fast as you can hit the keys, which gains a lot of speed over the competition.

Also, XyWrite holds your document in RAM, performing almost no disk access during editing sessions so you're never waiting for the system to come back up. Rarely do you lose control of the cursor for longer than a few seconds. These two features are what earn XyWrite its nickname Speedy, and you can see from the task scores how well the name fits.

The program boots in about 15 seconds, leaving the cursor on the command line. To get a directory of the data drive, you type DIR B: and hit Enter. Barely has your pinky lifted from the Enter key when the directory appears. Unfortunately, the directory is treated as a text file, so you can't select files by cursor pointing.



Instead, you must type CALL or EDIT (the first two letters will do) and the filename. Again, files appear on screen almost before you can blink; in the case of our task file, the whole procedure took 5 seconds. Only *Textura* was faster because of its cursor-pointing feature.

The search-and-replace function is always performed from the command line, and there are no prompts, which makes it a bit difficult to learn but also makes it faster to use. Thus, with a number of search and replaces to perform, XyWrite gives you a slight advantage by never moving the cur-

sor from the command line. You position the cursor in the file (XyWrite searches backward or forward), move to the command line by hitting F5, and type CH/search word/replace word/.

The CH stands for change all occurrences. By substituting CV for CH, you can ask the program to make the changes but to also stop at each one for user verification.

XyWrite was superb at handling the reformatting task. The program inserts special triangle symbols in the text to denote such things as margin changes. And though embedded commands generally detract from the look of a document, you can learn to live with them if they effect their changes on screen as instantly as they do in XyWrite. For example, to change the margins, you position the cursor at the top of the file, press F5 to move onto the command line, then type LM 10 for a left margin of ten. By the time the triangle has been

XyWrite II-Plus

The triangles in XyWrite denote format and print features, which you request on the command line (top left). We are using two windows here, divided by a line, to display both the beginning and the end of the document.

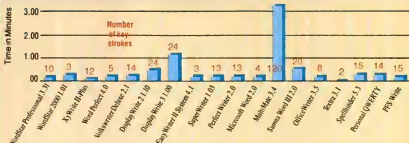
inserted on screen, the text has all jumped into alignment at the new setting, without need for reformatting.

At the command line, you type RM 70, and the margin changes are complete. Return to the command line again, type IP 15, which means indent the first lines of all paragraphs 15 spaces, and the reformatting is finished. This is one of XyWrite's benefits: you can rapidly experiment with formatting changes to see how they will look. And for the most part, what you see on screen is what you'll get on paper.

Outputting to an ASCII disk file or to

TASK 2

Retrieve a 4K ASCII file from disk to screen.



We began on the main menu or writing screen and measured the time elapsed until the first page of the file was visible on screen. All keystrokes were counted, including those to convert the ASCII file to program format.

the printer is another single chore on the command line. There is no printer menu because every control is embedded in the document itself.

Our biggest gripe against XyWrite is its documentation and its lack of a screen tutorial. As it is, there is no logical, ordered way to learn the powers of this incredible program.

ows and orphans, macros that are simple, both to define and to use, automatic date stamping, and paragraph numbering for generating outlines. And the way it handles footnotes and endnotes—simultaneously if you wish—deserves to become an industry standard.

It's easy and straightforward to get

started, although the program lacks any interactive screen-driven tutorial. The lessons in the manual make up for this somewhat, despite a few errors not listed in the addenda. In general, the documentation is very good though not adequate if you want highly technical explanations.

Word Perfect gave an average perfor-

FACT FILE



XyWrite II-Plus
XyQuest, Inc.
P.O. Box 372
Bedford, MA 01730
(617) 275-7194
List Price: \$295
Requires: 128K RAM, DOS 1.0 or later, one disk drive.

CIRCLE 638 ON READER SERVICE CARD

Word Perfect

Word Perfect is a world-class program, one of the best we tested. It consistently placed well above average in the nine tasks. Word Perfect has nearly every feature you'd need for any heavy-duty writing task, yet it is entirely menu driven from 40 function keys (F1-F10 combined with the Alt, Shift, and Ctrl keys) and their submenus, making it an attractive purchase for the home as well as office. Better yet, it's speedy.

In the features department, Word Perfect is well stocked with password protection (the only program we tested that has this feature), automatic corrections of wid-



Word Perfect

The writing screen of Word Perfect is free of clutter. You must rely on the function key template because the only information you get on screen is the location of your cursor. Dashed lines indicate page breaks.

Word Perfect's directory screen sets an example for the entire industry. To use a file, you simply highlight it with the cursor keys and press the desired option number. Also, it includes complete file information.

mance on the first task. The program boots to a writing screen that is blank except for the cursor at the top and the page, line, and column numbers at the bottom. From that screen you can list the files of the default drive with two keystrokes. The file list includes filename, extension, size, and creation date and time of your documents in the default drive. Below this directory is a menu for retrieving, deleting, renaming, printing, and inserting documents. To select one of these options, you simply move the highlight bar over its name and press 1 to retrieve it.

The gracefulness of this highlighting system gave *Word Perfect* very good scores on the third task, retrieving an ASCII file from disk to screen. It took half the time of the average program and two-thirds fewer keystrokes as well. The program was slightly better than average at searching and replacing and slightly worse for block moves. Again, however, the program's gracefulness came to the rescue of the slow feature. The move function key brings up a five-choice menu. By pressing 2 to select the paragraph option, the program automatically highlights the paragraph where the cursor resides. A two-choice menu allows you to cut or copy the blocked text. Either way, you simply press 5 to move it at another location.

Merging two files into one is a piece of cake for *Word Perfect*, requiring only eight keystrokes. Reformatting was even easier, as the program was among the six word processors that could handle the simple margin and initial paragraph line-indent changes automatically. Margins and indents can be inserted quickly, and although this shoe-horning causes all the text to become misaligned, reformatting the paragraph is simpler than with any other program because you only have to do it once. *Word Perfect* rewrites your entire document in a matter of seconds.

The print menu is mercifully fast and efficient; the submenus for printer control and options give you plenty of flexibility, including a choice among six preset printer interfaces.

Its regrettable features are, except for the line spacing, all minor. *Word Perfect* allows only six or eight lines per inch; that's all you can choose for single- or dou-

ble-spaced text (which also appears on the monitor as double-spaced). But in the long run, *Word Perfect* fared well in our testing, and it will not let you down in the office.

FACT FILE



Word Perfect 4.0
Satellite Systems, Inc.
288 W. Center
Orem, UT 84057
(801) 224-4000
List Price: \$495
Requires: 192K RAM, DOS 2.0
or later, two disk drives.

CIRCLE 643 ON READER SERVICE CARD

Volkswriter Deluxe

Volkswriter Deluxe was one of the first word processors designed specifically for the IBM PC, and although its limitations could present problems for heavy office work, it's an excellent choice for personal and small-business use. It is indeed the Volkswagen of word processors in the best sense of the term.

Volkswriter Deluxe is a combination menu- and command-driven program; a combination that works extremely well in this case. Actually, it's not so much a combination as a choice. You can use the function key commands while editing or return to the main menu and select functions from there. And the function key menu, which eats up seven lines of the screen, is easily toggled on and off.

The immediate benefit of this system is ease in learning it. *Volkswriter* is extremely easy to start up and drive around the block, even for newcomers to word processing and computers. Part of the reason is that *Volkswriter* doesn't have as many features—particularly high-end features like indexing, table of contents, footnotes, library functions, and a spelling checker—so the menus and function keys are not as crowded as in other programs.

Volkswriter sped through the first five tasks in fine form, beating the average time and keystrokes in each. The first task couldn't have been easier, and even someone unfamiliar with the package could do it without knowing more than how to type VX. The nicely designed main menu offers you 12 choices, and you make a selection by pressing just the first letter of the command you want. So the directory is called up by pressing D for Display All Files—a truly labor-saving technique. In case you want to change defaults, the program prompts you: "Which drive and path (such as C:\FINANCE)."

Pressing B brings up the directory screen, which only lists filename and extensions, and the directory disappears when you are prompted to retrieve a file. *Volkswriter* retrieved the ASCII file in good time and without conversion, but lines ran way off the edge of the screen. We pressed F8 to reformat the first paragraph, but in the absence of any hard carriage returns, it turned the file into one long paragraph. We should have done some other formatting first.

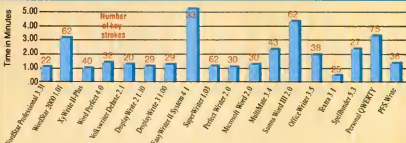


Volkswriter Deluxe

Volkswriter Deluxe displays a single line of information at the bottom of the screen during editing, but you can toggle a help menu for the function keys on and off at the top. Notice that the centering codes appear on screen.

TASK 3

Perform five search-and-replace operations.



We started with the cursor at the top of the file and measured the time elapsed until all five search-and-replace operations had been performed. We used backward search capabilities and counted only the keystrokes required for the operation itself, including cursor movements.

Once we re-entered the returns, everything went smoothly. The search-and-replace feature is clean and fast. Prompts for replacing words appear in the information line at the bottom of the screen. Global and local search and replace is a yes-or-no selection, and the cursor automatically returns to the top of the document once a search is completed. However, no matter what we did, *Volkswriter* refused to find the phrase we asked it for, evidently because the phrase itself was interrupted by a line break.

Merging files with *Volkswriter* is smooth and intuitive; it supplies prompts for every step. You position the cursor, press Alt-F2, type a filename, and give starting and ending line numbers for the file you want inserted. But the task of changing margins and paragraph indents took a minute longer than the average program. As with many programs that lack a first-line indent setting for paragraphs, we resorted to indenting by hand with tabs. Needless to say, this would have taken much less time if the indenting had not disrupted every paragraph, forcing us to re-format them with F8 as we went along. What *Volkswriter* and many other programs really need is a global reformat command.

Volkswriter doesn't have many exotic print features, with the notable exception of a high-speed mode that works with laser printers, but the ones it does have are clever. If you need to change or examine the print control settings, you can return to the main menu and enter the print menu. This process took longer than average with *Volkswriter*. But if your print settings are

ready to go, you can send the document from editing screen to printer in 8 seconds and with just 2 keystrokes, a fine feature.

The major weakness of *Volkswriter* is formatting. It is difficult to reformat each and every paragraph you change. And because embedded commands show up on the display, heavy formatting makes the text difficult to read. Still, *Volkswriter Deluxe* is fine for personal use. It takes you most of the places you want to go with as little fuss as possible.

FACT FILE



Volkswriter Deluxe 2.1
Lifetree Software
411 Pacific Street, #315
Monterey, CA 93940
(408) 659-3221
List Price: \$295
Requires: 128K RAM, DOS 1.1
or later, two disk drives.

CIRCLE 650 ON READER SERVICE CARD

DisplayWrite 2 and DisplayWrite 3

IBM's *DisplayWrite 2* and *DisplayWrite 3* are nearly identical; the latter includes several additional useful features. The *DisplayWrite* line, which emulates IBM's *DisplayWriter* standalone word processor, was designed for office work, offering extensive formatting and printing features. The programs are page-oriented, holding only a single page of text in memory at one time, yet this design doesn't

slow them down as much as it does most page-oriented word processors. Although both programs have a number of useful menus, they are not entirely menu-driven. You enter some commands through the function and control keys.

DisplayWrite 2 comes on two disks; *DisplayWrite 3* occupies four. Both programs require a disk switch between booting and editing, which makes them better suited for a hard disk. *DisplayWrite 2* isn't bad on floppies, but with *DisplayWrite 3*, you have to do too much disk flipping to easily forego the hard disk.

The first noticeable difference between the programs is their opening menus. *DisplayWrite 2* has 10 selections, while *DisplayWrite 3* has 13; it adds the ability to create and revise file descriptions and to perform DOS tasks. The range of features you can reach through branching menus gives you a lot of control over your files.

In most of the tasks we performed with the two *DisplayWrite* versions, neither program could be described as better than average. In fact, they were almost consistently slower than the average program. Because we had not created our ASCII task files with *DisplayWrite*, neither program would just load the files to the screen. Instead, we had to create a new blank document and read in the files.

The search-and-replace function of both programs, however, is unusual and superb. You control it from a separate screen that offers prompts for performing up to three different search-and-replace operations simultaneously. You simply fill in the prompts for words and search criteria, and then it completes all three opera-

tions as quickly as many programs handle just one. This method of implementing the search-and-replace function should be an industry standard.

The *DisplayWrite* programs use the convenient cursor-highlighting method for all block operations. To move a block, you position the cursor at its beginning, then "paint" the text you want to move by putting the cursor at the end of the block and pressing Enter. Finally, you move the cursor to the place you want the text to go and press Enter once more. Still, since you can't move the cursor in word, sentence, and paragraph increments, block moves are fairly slow with *DisplayWrite*. However, merging a pair of files is a simple menu operation that the programs manage at a good clip.

Though the programs can't automatically indent all first lines of paragraphs, they did well on the task of reformatting. You can make margin changes and tab

stops on the ruler line without any fuss. You insert paragraph indentations by moving to the first character of each paragraph and hitting the tab key once to reach your setting. Of course, major changes like these leave your text in disarray. It's too bad *DisplayWrite 2* and *3* don't offer automatic paragraph reformatting, but at least the function is semiautomatic: to realign the entire document, all you have to do is select *Paginate Document* from the main menu.

DisplayWrite 3 was much faster than *2* at printing the text to an ASCII disk file, but both programs achieved excellent scores for outputting to the printer—they took just 8 seconds and 4 keystrokes, half the time of the average program. The reason: both programs have excellent default printer settings, most of which do not have to be changed or even checked.

Storing your document and exiting to DOS couldn't be much easier than it is

with the *DisplayWrite* programs. First, you automatically save your work when you press F2 to go to the main menu. It's great: When you want to quit, you can quit, confident that the program has preserved your work.

Ultimately, you'll only want to consider *DisplayWrite 3*. You should ignore *2*, which, incidentally, is the only program PC reviewed that lacks an on-line help feature. The newer program easily gives you an extra \$50 worth of features, including proportional spacing, footnotes, a much better spelling checker, and the ability to change screen colors, save blocks, and re-define the keyboard. *DisplayWrite 3* might well have been a revision of *DisplayWrite 2* instead of a new program. Given the small price difference, there's little reason to invest in *DisplayWrite 2*.

FACT FILE



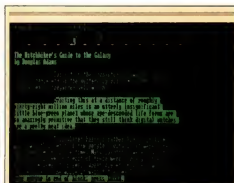
DisplayWrite 2 1.10
IBM Entry Systems Division
Box 1328-S
Boca Raton, FL 33432
(800) 447-4700
List Price: \$299
Requires: 192K RAM (DOS 2.x), 256K RAM (DOS 3.x), two disk drives.

CIRCLE 653 ON READER SERVICE CARD



DisplayWrite 3 1.00
IBM Entry Systems Division
Box 1328-S
Boca Raton, FL 33432
(800) 447-4700
List Price: \$349
Requires: 256K RAM, two disk drives.

CIRCLE 652 ON READER SERVICE CARD



DisplayWrite 2

The editing screens for *DisplayWrite 2* and *DisplayWrite 3* are identical. Shown here is *DisplayWrite 2* in the middle of a Wang-like block move. Notice the helpful prompts at the top left and bottom left of the screen.



DisplayWrite 3

The *DisplayWrite* family is known for its excellent printer control features. To change an option on this menu, you type the number of the new choice. Again, notice the highlighted prompts.

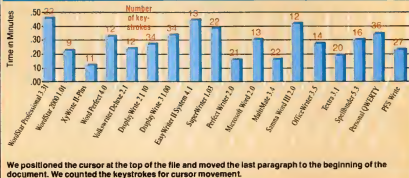
EasyWriter II System

EasyWriter II System combines a spelling checker and a mail-merge program with a full-featured word processor. The programs, which used to sell separately, are now billed as a "complete office."

EasyWriter has excellent documentation and a logical design, which make it fairly easy to learn. However, since the

TASK 4

Move a block of text from bottom to top of file.



program is both mode and page oriented, it has drawbacks for both beginners and experienced users. It would be much easier to use if you didn't have to switch back and forth among the editing modes for character, word, sentence, line, and paragraph.

EasyWriter II System performed poorly on our tasks with few exceptions, largely because of its page orientation and its slow text-reformatting feature. If you change a paragraph, you must reformat it individually, shackling the editing process.

The program is also a bit slow in booting to its nine-choice main menu. If you like, the file directory can open beneath this main menu, an excellent feature. You can select your function and your file together. But before you can open a file you must open a file folder, which is *EasyWriter's* way of partitioning your disk working space into chunks of 76 pages each. Why it does this is a mystery, but because you can only open one file folder at a time, you have no way of seeing all your disk files—a serious limitation.

EasyWriter was able to whisk the ASCII file from folder to screen in an impressive 12 seconds, and the layout of the screen itself is wonderful. Across the top line are indicators for the current mode, percentage of memory that is full, line, column, page numbers, document name, and system date. Just beneath this information is the ruler line, which doubles as *EasyWriter's* method for setting margins, tabs, and other formatting features. The rest of the screen is uncluttered and easy on the eyes.

The search-and-replace task with *EasyWriter* was time consuming; the pro-

gram constantly dumped pages in and out of memory when moving through the document. It's easy to operate the function itself, but you spend a lot of time staring at the screen, waiting for the computer to catch up. We found *EasyWriter* much better at block moves.

EasyWriter was the slowest of all 18 programs at merging our second file onto the end of the first. It does allow you to put any amount of text from one file into any part of another file, but it does so using the most roundabout method available. With the introduction to Douglas Adams's novel on screen, our object was to merge another file, the first chapter, at the end. First, we had to close the introduction file and open the first-chapter file, tagging its beginning and end with special markers. Then we had to call up the introduction again, position the cursor at the end of the file, and carry out the merge. This procedure was far too tedious to do without windows for

each document.

EasyWriter's worst problems, however, surfaced when we tried to reformat the margins and insert paragraph indents. The ruler line made it simple to change the left and right margins and set tabs, but since *EasyWriter* lacks a command for automatic paragraph indents, they had to be added by hand. The true problem, though, was that the screen took abnormally long to re-write itself after the margin changes and after reformatting each paragraph individually, in addition to the time it always takes to dump pages in and out of memory.

Printing to an ASCII disk file was also a lengthy procedure in *EasyWriter*; it doesn't require that many keystrokes, but you have to swap disks twice. Outputting to the printer was faster. Storing and exiting the program is the essence of simplicity—automatic file saving reduces the process to just three keystrokes.

EasyWriter II System has many good



EasyWriter II System

EasyWriter II has a simple method for handling documents. The directory appears below the main menu, and you select a document by typing its number.

features and many drawbacks as well. Because of its sluggishness, it is much more suitable for short and repetitive work than it is for any sort of creative endeavour.

FACT FILE



EasyWriter II System 4.1

Sorcim/US
2195 Fortune Dr.
San Jose, CA 95131-1805

(415) 331-6700

List Price: \$395

Requires: 192K RAM, DOS 2.0 or later, two disk drives.

CIRCLE 641 ON READER SERVICE CARD

SuperWriter

SuperWriter's user interface is odd, a combination menu-driven, command-driven program lacking intuitive design. The main menu of commands, which is opened in a small window across the bottom of the screen, reads:

C D F G I N R S X Z C R / TAB ESC

We dare you to decipher half of those supposed mnemonics correctly and to remember them once you have. And some of these commands aren't appropriate to a main menu, such as N for Normalize, which lets you change case.

Strangely, print enhancements do not appear on screen as anything more than symbols. To insert them, you must bring up a submenu by pressing Ctrl-P. You can

then select from boldfacing, centering, italics, underlining, hyphens, hanging indents, and so forth. We concluded that SuperWriter might as well be entirely command driven, because it could hardly be more difficult to memorize a list of commands than its network of hard-to-understand menus.

Nevertheless, SuperWriter scored very well on the tasks, better than the average program on eight out of nine. Perhaps the combination of menus and commands yields some speed, but it hardly seems worth having to seek a reference card so frequently.

SuperWriter boots quickly to a main menu of six alternatives: Edit, Quit, Print, Check Spelling, Disk Directory, and Utilities. Choosing any one of the latter four options produces a further array of menus. After checking the directory for the name of the file, you must return to the main menu, select Edit, and type in its name to call it to screen.

Replace is an option from the main editing menu, and because you can move to the top of the file with nothing more than a single keystroke, SuperWriter accomplished the search-and-replace task quite quickly, taking nearly a minute less than the average program.

Block moves and merging of files are also simple tasks with SuperWriter. But take a look at its performance on reformatting the margins and creating paragraph indents: 24 seconds and 18 keystrokes, right behind XyWrite and Textura. It was one of the easiest tasks for SuperWriter.

Printing, storing, and exiting also took little time, though once again SuperWriter's unusual design meant we had to write down the keystrokes during testing if we wanted to to keep them in mind for longer than a minute or so. SuperWriter's extensive command list lets you do lots of fancy formatting, but almost all of these commands are embedded in the text. The result is a display that looks nothing like what you get from the printer.

SuperWriter would likely fill the needs of any home or small business, but its antique design leaves it behind many of the other feature-laden programs we looked at. One last note: SuperWriter is the only program that doesn't give you control over placement of page numbers.

FACT FILE



SuperWriter 1.03

Sorcim/US
2195 Fortune Dr.
San Jose, CA 95131

(415) 331-6700

List Price: \$295

Requires: 64K RAM, DOS 1.0 or later, one disk drive.

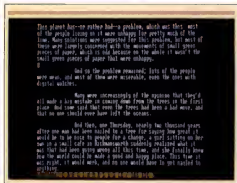
CIRCLE 640 ON READER SERVICE CARD

Perfect Writer

Well, it isn't perfect, but Perfect Writer deserves much credit for its unusually good menu system and for its selection of features, making it one of the best personal word processors on the market. It would be suitable for small-business use, too.

Perfect Writer uses a pop-up menu design, which comes in handy when learning to use the program. For the most part, even beginners can feel their way along by pressing the first letter of the word that sounds like it will lead to the intended command. The main menu appears in a small window over your document when you press Esc, much as it does on the Macintosh computer, and submenus simply take its place. And when you do go down a series of wrong menus, retracing steps to other branches is simple.

Admittedly, you have to memorize the

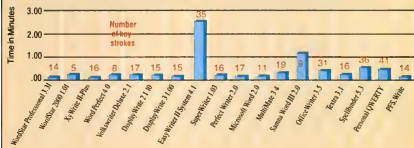


SuperWriter

SuperWriter's display yields maximum writing space by using just a single-line option menu. As you can see, however, the menu is too skimpy, and you must memorize what the letters stand for. How many seem obvious to you?

TASK 5

Merge a file onto the end of the current file.



We positioned the cursor at the top of the first file and appended the second file to the end of the first one. We counted all keystrokes.

menu structure. The menus containing certain commands, notably underlining, seem extremely difficult to find on the first few times around the block. It's a big block, too: 28 menus branch from the main menu. For the preparation of most documents, you'll only use eight or ten of the menus, but it's comforting to know the special features lie in wait, from outline numbering to verse format to boldfaced italics to a roman typeface.

Perfect Writer performed quite admirably on the first five tasks, then coasted to a less-than-impressive finish on the last four. Booting the program is extremely fast, taking only 10 seconds or so before you are able to begin writing. To reach a directory of the data disk in drive B:, you first press the escape key to open the menu window, then Documents, List, and the drive letter. Retrieving the ASCII file was just as easy. *Perfect Writer* accomplished the first two tasks in nearly half the time of the average program.

Perfect Writer's search-and-replace functions are generally superb and shaved a minute off the average time score. One reason is that the cursor returns to its original position after the search. Another reason is the main menu's Repeat command. After one search-and-replace session, you can get all the way back to the prompt for a word you want replaced with two commands, Esc and Repeat.

However, *Perfect Writer* simply refused to find and replace the phrase "Panic if you want to" with the correct phrase "Don't panic," seemingly because the words *want* and *to* were separated by a line break—a serious problem.

While the program performed block moves and merged files at lightning speed and with great ease, when it came to reformatting the margins and indenting for paragraphs, *Perfect Writer* worked like a hacksaw going through oak. It's easy to change the margins: from the main menu you type Operation, Setup, then Right and Left Margins and enter the values. Very few keystrokes so far, but your document looks unchanged when you return, and it is, until you use the Appearance, Paragraph, and Fill commands on each and every paragraph in the document! Fill should be a global command.

Creating paragraph indents was even worse. Since *Perfect Writer* lacks any global commands for this function, we were forced to insert them by hand, which resulted in *Perfect Writer's* terrible keystroke score of 351.

Perfect Writer took longer to print to disk file and printer and to store and exit to

DOS, apparently because the menu system slows it down a bit. However, since you can delay the appearance of menus for up to 9 seconds, once you learn the commands, you can fly through the procedure—the menus are active even when invisible.

Perfect Writer was not designed for a large office, but it's a good program and has plenty of options for home use. And besides *Word*, it's the only program we looked at that supports a mouse.

FACT FILE



Perfect Writer 2.0
Thorn/EMI Computer Software, Inc.
3187 Cirway Ave.
Costa Mesa, CA 92626
(415) 527-2626
List Price: \$199.95
Requires: 128K RAM, DOS 1.1 or later, two disk drives.

CIRCLE 639 ON READER SERVICE CARD



Perfect Writer

Here's the main menu of *Perfect Writer*, which pops up when you press the Esc key. A submenu pops up when you point to the highlight or type the first letter. The program is extremely easy to operate, but getting lost in the menu-maze can also be easy.

Microsoft Word

Microsoft Word 2.0 is a power program that packs in more features than any we tested. It did not, however, place first in any of the nine tasks. While not noticeably slow, it trades speed for extra capabilities. Its menu-driven approach is identical to that of *Multiplan* or *1-2-3*: Just press the first letter of the command you want and a submenu of further choices replaces the current menu. And just in case you hate menus, *Word* lets you access most editing and formatting features with Alt-key combinations. You can also edit using a mouse.

The documentation is attractive on the surface, but not at all helpful if you want to plunge into untested waters head first. *Word* is designed to be learned through the program's marvelous on-screen tutorial, and indeed, this 2-hour course on disk is the fastest possible way to master the program. *Word*'s unintuitive menu choices make commands hard to find and remember. Thus, getting started with *Word* may require more patience and time than with most programs.

Word did not perform well on the first task of booting up and reaching the document directory, but it's worth noting that you have the choice of booting for monochrome, color, or special graphics (a Hercules card, for example, lets you boot a 90-character by 43-line display). You can also boot with automatic loading of the file you specify or the last document you worked on. This convenient feature would have let

Microsoft Word score very well if the task had been booting from the DOS prompt to a document.

In fact, *Word* retrieves directories and documents with excellent speed and grace, as the results of the second test prove. You press Esc to activate the main menu, T for the transfer menu, L for load, then the right arrow key to bring up a listing of files from the default drive. At this point, you simply point to the file you want and press Enter. It's a simple device that eliminates typos and makes sure that you get the file you want.

Word performed well enough on the search-and-replace task, and while its scores are average, the operation itself is simple. As with other programs, a single keystroke brings up the prompts for the search-and-replace criteria, but unlike many, *Word* does not leave the cursor hanging at the last replacement—it brings it back to wherever you began the search. In fact, the computer doesn't drag you along and make you watch. Speaking of the cursor, *Word*'s is a gem: it doesn't blink (unless you set it to do so).

Most word processors could learn a thing or two from *Word* about merging and formatting existing text. To merge a document with the one on screen you simply go into the transfer menu, select Merge, and give the filename. *Word* merges the new file in at the cursor position. Changing the margins, the initial paragraph indent, and, indeed, changing nearly any formatting parameter in this program is a simple matter of setting a switch on the multiple-

switch menus that pop up over the bottom half of the screen.

Enhancing and formatting text is also easy with *Word*, particularly if a piece of text will have more than one enhancement. First, you select or highlight the desired text, and *Word* has a good range of keys for accomplishing this. Then, for example, you can underline and boldface the words in one fell swoop by turning on those switches from a single menu. Of course, if you'd rather drive those functions with Alt-key commands, you can save a little more time.

Although PC's nine tasks don't illustrate this fact adequately, the real beauty of *Word* is its output. *Word* supports almost anything any printer can do. Take a good look at a document produced with *Word* on a laser printer with multiple fonts, justified and proportionally spaced: It is the dream of writers and office managers everywhere. *Word* takes the prize for having the highest quality output of any of the programs we tested.

FACT FILE



Microsoft Word 2.0
Microsoft Corp.
10700 Northrup Way
Bellevue, WA 98009
(206) 828-8080
List Price: \$375

Requires: 192K RAM (256K with library), DOS 2.0 or later, two disk drives.

CIRCLE 647 ON READER SERVICE CARD



Microsoft Word

The separation of writing screen and menu couldn't be clearer than in *Microsoft Word*, yielding one of the most "readable" displays we tested. Still, the choice of words on this menu makes the program awkward to learn.

MultiMate

MultiMate is a full-featured, page-oriented office tool whose design is modeled on the dedicated Wang word processor. The system is designed to accommodate a large staff and uses a document summary screen with each file to record name, author, addressee, operator, number of pages, key words, comments, and creation and modification dates. As you can imagine, this screen is a great help in performing document searches.

Getting started with *MultiMate* is straightforward; it has excellent documen-

TASK 6

Reformat margins and indents of merged files.



The task of reformatting the file entailed changing the margin settings and inserting indentations. And in many programs this required an extraordinary number of keystrokes. We counted one keystroke each for each line move with the cursor arrow key.

tation (sensibly divided into a beginner's, an advanced, and a reference manual) and extensive on-screen tutorials. However, *MultiMate* is mostly a command-based system with a few menus thrown in here and there; it has literally hundreds of commands to learn. In fact, only a handful of keys are not used for *MultiMate* functions. The large keyboard template and stick-on

Because *MultiMate*'s proprietary file system is far from DOS compatible, the program refused to load our ASCII file for the second task. In fact, the names of the two ASCII files did not even appear on the directory because they are not *MultiMate* documents. *MultiMate* includes a simple translation routine to deal with importing and exporting ASCII files, which added a

looking at your keyboard template far too often. The on-line help, although extensive, doesn't solve the problem.

MultiMate's excellent screen prompts made the search-and-replace task easy to accomplish. First it asks if you want a global or discretionary search, and you enter the corresponding letter. Then it prompts: "Replace What?" After typing in the word you want searched, you are prompted: "Replace With What?" It would be difficult to go astray.

Still, *MultiMate* was slow, largely because it is a page-oriented system that only keeps a single page of text in memory at any one time, reading and dumping each page from memory as it searches. Although page-oriented word processors generally take longer to perform most tasks than document-oriented products, they do have their benefits: even during a power failure, the maximum text you can lose is one page. It's a trade-off: a bit more confidence for a bit less speed.

MultiMate has powerful merge capabilities, both during printing and during editing. You can merge any part of any document from any drive into any position in the current document without a lot of fuss. First, you position the cursor where the insertion should begin, press Shift-F8, and type the filename you want inserted. This file then appears on-screen, and you highlight the section you want moved. A good range of cursor control keys in *MultiMate* facilitates this chore.

Block operations are similar: *MultiMate* prompts you to highlight the text for the operation, an excellent technique borrowed from Wang. *MultiMate* performed



MultiMate

MultiMate's Document Summary Screen is an important and powerful feature of the program, borrowed from Wang. It has not only an information record for each file but also a very handy method for searching for specific files.

key labels are a big help.

The program boots quickly to a main menu of nine choices, and getting a directory of documents is easy—just tell *MultiMate* you want to edit an existing document and up comes a directory screen. By pressing one key, you can obtain the directory for any drive, which yields statistics for the drive itself but nothing more than names for the files. You get further information from the document summary screen, which appears the moment you select a file.

disk swap and nearly 3 minutes to its score on the second task. Once the document was translated, *MultiMate* could call it up in half the time of the average program.

MultiMate's screen display is good, providing maximum writing space by eating up only the top lines of the screen with information: name of document, page, line, and column numbers. Still, with so many commands to remember, it might have been worthwhile if the publisher had included a prompt menu for the most commonly used functions. You just can't avoid

the block move task in half the time of the average program and in a very intuitive fashion.

Its procedures for reformatting, however, were neither fast nor intuitive. *MultiMate* performed this task in several lengthy stages. It has no function to insert the initial paragraph indents, so we had to create them by setting a tab stop 15 spaces in from the left margin on the ruler line. Then, paragraph by paragraph, we laboriously "tabbed" in the indents. Annoyingly, the left margin cannot be set from the editing screen's ruler line, only from the printing menu. But to set the right margin, you simply move to the column position on the ruler line and press Enter. Why shouldn't the left margin be set from the ruler line, too?

Printing is one of *MultiMate*'s fortes; it has superb controls and supports an incredible list of printers—a full 275. You can modify its printer action tables, a feature that could benefit every word processor.

MultiMate is a workhorse—it's not very fast, but it can handle some heavy-duty word processing.

FACT FILE

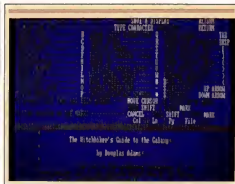


MultiMate 3.4
MultiMate International Corp.
52 Oakland Avenue North
East Hartford, CT 06108
(203) 522-2116
List Price: \$495
Requires: 256K RAM, DOS 3.1
or later, two disk drives.

CIRCLE 646 ON READER SERVICE CARD

Samna Word III

Samna Word III was designed for office work. It has most of the heavy-duty features a corporate staff might want, including the *Merriam-Webster Proximity Dictionary*, line drawing for organizational charts, up to six levels of outline numbering, math functions for columns or rows of figures, user-defined function keys, an undo feature, windows, and much more. But unless you want to litter your keyboard with the stick-on decals the publishers supply, you're going to have



Samna Word III

Samna Word III uses the top of the screen to display help menus, and so you never lose sight of your text. The top of the file has a format line for setting tabs and margins, which are graphically shown on screen.

trouble remembering *Samna*'s immense variety of features.

Samna was the only program among those we tested that took longer than a minute to handle the first task of booting and reaching a directory of the B: drive. It is also the only program that required a disk change in the loading process, and one of four with copy protection. The screen display is more functional than attractive, with distinct margin areas where the cursor cannot reach.

The program balked when it came to retrieving the ASCII file. *Samna* will only deal with its own proprietary file format and requires a translation first. This fastidious quirk added a few keystrokes and a lot of time to the second task, which the program performed in 9 seconds with 7 keystrokes once the file had been translated to *Samna*'s own format.

Samna's performance continued to worsen with the search-and-replace task, which took almost 5 minutes. Its block move and file-merging scores weren't very good either. But reformatting is what really gave *Samna* heartburn. It took more than 6 minutes to change the margins and insert the paragraph indents. The margins and paragraph indents are actually simple to set for the operator, but then the document must alter itself line by line to adjust to the changes. It's an automatic procedure but painfully slow.

Translating the program's document file back to an ASCII file was pleasingly swift and easy, but getting the finished file to the printer seemed to take longer than

necessary. Only in the last task, storing the file and exiting to DOS, did *Samna* show any spunk, coming in second only to *Xy-Write*.

Samna left us nonplussed. On one hand, it has nearly every feature you'd want in an office, even some that *WordStar* lacks. On the other hand, it requires a lot of study to get a firm grasp on the program, partly because it dedicates so many keys to functions.

And of all the programs offering a built-in spelling checker, only *Samna* doesn't allow you to create your own customized dictionary.

FACT FILE



Samna Word III 2.0
Samna Corp.
2700 NE Expressway, #C700
Atlanta, GA 30345
(404) 321-5006
List Price: \$550
Requires: 256K RAM, DOS 2.0
or later, two disk drives.

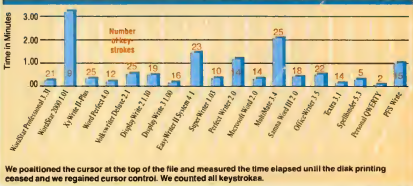
CIRCLE 644 ON READER SERVICE CARD

OfficeWriter

OfficeWriter is a *MultiMate* clone, or, if you like, a Wang clone, and a very good one, too, that includes a utility to import Wang documents. Like *MultiMate*, *OfficeWriter* was designed for the office, not the home. As a result, it sports nearly as many advanced features, such as library

TASK 7

Print the completed document to an ASCII disk file.



functions, print spooling, and a powerful mail-merge function, as *MultiMate*, and it is actually a little easier to use. *OfficeWriter*'s command system is more tightly and logically structured than *MultiMate*'s. What's more, *OfficeWriter* is faster than the other program.

Still, most features are identical in the two products. The program boots a little more quickly than *MultiMate*, bringing you to a similar menu screen of eight choices. The Manage Documents option brings up a useful directory menu screen allowing you to delete, rename, copy, and move documents from drive to drive, among other things. Once a document has been selected for editing, a document summary screen appears, containing information nearly identical to that on the *MultiMate* summary screen.

The biggest difference between the two word processors is the way they handle files. Although *OfficeWriter* would not

call up our ASCII file with an extension of .ASC, it did not balk once the extension was removed, an advantage over *MultiMate*.

OfficeWriter searches and replaces faster than *MultiMate*, too, by using a nifty little trick. Like *MultiMate*, *OfficeWriter* is slowed down by its page orientation, but, to our surprise, we didn't experience the same time delays between pages as with other page-oriented programs. In fact, *OfficeWriter* let us move from page to page in our three-page text file at lightning speed and without dumping and reading pages out of and into memory. How did it manage this? By keeping the document on one long page (up to 64K) and allowing you to repaginate later, *OfficeWriter* gets you around a serious limitation of page-oriented word processing.

OfficeWriter's speed and operation in block moves and file merging were almost identical to *MultiMate*'s. To make block

operations easier, *OfficeWriter* also borrows Wang's text-highlighting feature. But look at the difference in reformatting scores: 3 1/2 minutes less to change the margins and insert paragraph indents! As with *MultiMate*, the program has no feature that automatically inserts the paragraph indents, but *OfficeWriter*'s extra movement speed made the difference.

OfficeWriter's scores for outputting to disk and printer were a little better than *MultiMate*'s, but not enough to make any difference, especially since *MultiMate*'s printing control options are more sophisticated.

OfficeWriter is a good word processor, and although *MultiMate* is better suited for most heavy-duty office work, *OfficeWriter* is easier to learn. The documentation is clear, and doesn't waste words; you are, however, left hanging if you want highly technical information.

All things considered, choosing between the two is difficult. If you are interested in one, make sure you check out the other.

OfficeWriter, incidentally, is the only program we tested that required a key disk to be run from a hard disk.

OfficeWriter

Though *OfficeWriter* is a *MultiMate*/Wang clone, it offers some improvements. This Manage Documents menu, for example, facilitates many file-handling operations. You simply highlight a document and press a function key.

FACT FILE



OfficeWriter 3.5
Office Solutions, Inc.
2802 Cobo St.
Madison, WI 53713
(608) 274-5047
List Price: \$445
Requires: 192K RAM, DOS 2.0
or later, two disk drives.

CIRCLE 645 ON READER SERVICE CARD

Textra

You may be surprised to find a word processor that sells for only \$9.95 included in this roundup, but wait until you've read the whole story before you make up your mind about *Textra*. It's really a fine word processor for personal use, although it's not likely to do well in business situations.

The price dropped from \$49.95 to \$9.95 the day after we reviewed *Textra*, and we had already pronounced it a honey of a bargain. The fact is, any day now, a new release, *Textra 3.1a*, is due. The new version will sport a dozen extra features and improvements at the original \$49.95 price.

The best way to learn how to use *Textra* is to jump right in and start writing, experimenting with the features of the function key menu as you go, and return to the manual only when you get stuck. The ten function

keys control everything in *Textra*, and the menu is always on screen; *Textra* simply changes the labels for the function keys as you move from menu to menu. On-line help is fast and generally ample enough to solve most problems. Some of the help screens include animated illustrations that the documentation aptly calls film-on-disk tutorials.

We were so shocked by the performance of *Textra* with our nine tasks that we ran them more than once just to make sure we hadn't dreamed up the whole thing. Booting from DOS and reaching a directory of drive B: took just 13 seconds, less than half the time of the average program and only one second slower than the fastest performer, *WordStar*. *Textra* boots to a main directory that lists your files (name and extension only) on the default drive. And the F5 key lets you change directories from drives A: to D:.

The list of filenames is numbered; so

when it came to the second task, retrieving the ASCII file, it was only necessary to press the file's directory number and the Enter key. Two keystrokes and 3 seconds brought the file into view on the editing screen. The full screen is used for text display except for the function key menu, which takes up one line at the bottom.

Textra also had the fastest time and nearly the lowest keystroke requirement for the search-and-replace task. It was the only program of the 18 to perform all 15 replacements in less than a minute. The search-and-replace function itself is no easier than any other program's, it just takes less time to search.

The program was also excellent at handling block moves and merging two files into one, beating the average program by 10 seconds in both cases. But it was in reformatting that *Textra* really shone. It took just 21 seconds to change the left margin and the right margin, insert the paragraph indent, and view the changed text; a time second only to *XyWrite*'s astounding 15 seconds. *Textra* achieves this speed by grouping those three functions together on the same menu screen, just one keystroke away from editing. The beauty of reformatting with both *Textra* and *XyWrite* is that execution of the changes occurs at the speed of RAM.

Textra's excellent print and save menus gave the program an edge on the last three tasks. You print to disk and output to a printer from a single full-screen menu that includes a lot of control settings. Similarly, the save menu automates a lot of your work by giving you options to save with or without special control characters, with the same filename or a new one, to save and exit or to save and resume editing, or to call up a new file. Because the directory listing of files appears on this screen as well, you can call up another file with a single key.

What's missing from *Textra*? Well, it won't deal with documents longer than about 30 or 40 pages, and while it has all the common word processing features, don't expect it to do any fancy formatting. It's the only word processor we looked at that can't control tab settings, doesn't give you header/footer placement control, can't delete by block, can't erase files, and



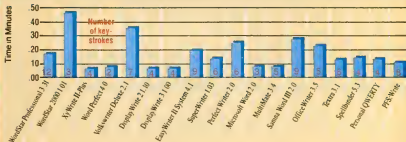
Textra

Textra's help screens are informative and helpful, including a unique feature called "film-on-disk." If the help message does not give enough information, you can run a tutorial example before you return to your document.

Textra has a very clean writing screen. As in *SuperWriter*, only one line is used for the menu, but it's enough in this case. Another menu of function keys is available by pressing F1.

TASK 8

Send the completed document to a printer.



We measured the time elapsed from the moment work was finished on the document until the first character reached the printer.

doesn't have a mail-merge facility. Nonetheless, for the money, nothing even comes close to this product. It's an excellent word processor for personal use.

FACT FILE



Extra 3.1
Ann Arbor Software
407 N. Main
Ann Arbor, MI 48104
(313) 769-9088
List Price: \$9.95
Requires: 128K RAM, DOS 1.1 or later, one disk drive.

CIRCLE 655 ON READER SERVICE CARD

Spellbinder

Spellbinder is an excellent example of how benchmark data doesn't always tell the full story: Although *Spellbinder's* scores on the tasks are not bad, the program is exceedingly difficult to learn and use. If *PC* had offered the program for free to the testers, it would have found no takers. That isn't to say *Spellbinder* doesn't have power—it does, somewhere. But like a programming language, the power is very slowly attained and only through experimentation. *Spellbinder's* strange mixture of function key menus with a command line generates too much confusion to make mastering the power worthwhile unless you are into programming and logic puzzles.

If you are, that's good, because the manual won't be much help. It's thick, but that's the most you can say for it. The in-

dex and organization are next to useless; so you have to do lots of digging and lots of reading that you really don't want to do. There's just no other way. The on-line help doesn't go far enough into any topic to solve most problems. Further, the manual looks like it was generated on a manual typewriter, the original was lost, and it was printed from a blurry photocopy. People deserve more than this from an expensive word processor, even if they enjoy figuring things out for themselves.

Booting *Spellbinder* and reaching a directory of drive B: took longer than with the average program, although paradoxically it took fewer keystrokes. The directory only yields the name, extension, and approximate size (in K) of files. Function key menus, displayed at the bottom of the screen, change as you move from mode to mode. In the disk menu are function keys for calling directories from drives A: and B:, for getting a file, automating the load-

ing procedure, and so forth. Still, it's very easy to get bogged down by the excessive number of modes in *Spellbinder*, no matter what you're doing.

While passable, the program's scores on the search-and-replace task suggest that this feature is not *Spellbinder's* forte. Indeed, the feature is very clumsy for one so commonly used. Block moves and merging of files, while difficult to learn, are actually quite easy to perform once you get used to the procedures.

The reformatting task just seemed to drag along. It took relatively few keystrokes to make the margin changes and insert paragraph indents, but the program required too much time between steps. And we got it wrong so many times during the testing that it became an inside joke to be *Spellbound*.

The last three tasks, printing a file to disk and printer, saving a file, and exiting to DOS, posed no problems and set no re-



Spellbinder

The disk directory menu of *Spellbinder* is almost as confusing as the rest of the program. Learning what F3-F9 do is frustrating without prompts. And *Spellbinder's* menu system is a failure.

WORD PROCESSORS

cords either. In all fairness to the software, it has a wealth of features to be summoned. Learning to summon them is the trick. There is, however, a Macro command on the main editing menu that produces a selection of macros for a mail-merge function; alphanumeric sorting; two-column, line-numbered, and multiple-file batch printing; boiler-plate operations; and a fill-in-the-forms program.

Spellbinder is the only program we reviewed that doesn't use color.

You certainly could use this word processor in business. The question is, would you?

FACT FILE



Spellbinder 5.3
Lexisoft, Inc.
Box 1378
Davis, CA 95617
(916) 758-3630
List Price: \$495

Requires: 64K RAM, DOS 2.0 or later, two disk drives.

CIRCLE 651 ON READER SERVICE CARD



Personal QWERTY

Personal QWERTY shows its disregard for convention by forcing you to type and edit on the bottom line of the screen, as if to imitate a typewriter. Notice the user-created format line that sets margins and paragraph indents.

Personal QWERTY

Personal QWERTY is one of the least expensive products we reviewed; it is also one of the most limiting and confusing. Don't be misled into thinking *QWERTY* doesn't have its good points, but

it has an unconventional design. Documentation is literally minuscule: 43 pages in a 4- by 4-inch booklet with no index. It is safe to say that a fuller, better organized manual would increase the program's usefulness. As is, we wouldn't use *QWERTY* for anything other than fast and simple correspondence, and if that's all you need, you should really try *PFS: Write*.

General Features

Word Processing	List price	Number of disks	Possible backups	Estimated time to install	On-screen tutorial	How extensive	Textbook tutorial	How extensive
WordStar Professional 3.31	\$495	5	no limit	25 min.	yes	adequate	yes	complete
WordStar 2000 1.01	\$495	7	no limit	20 min.	yes	complete	yes	complete
XyWrite II-Plus	\$295	1	no limit	45 min.	no	very	yes	good
Word Perfect 4.0	\$495	4	no limit	40 min.	no	—	yes	good
Volkswriter Deluxe 2.1	\$295	2	no limit	20 min.	yes	minimal	yes	basics
DisplayWrite 2 1.10	\$299	2	no limit	20 min.	no	—	no	—
DisplayWrite 3 1.00	\$349	4	no limit	30 min.	no	—	no	—
EasyWriter II System 4.1	\$395	4	no limit	1 hour	yes	adequate	yes	good
SuperWriter 1.03	\$295	1	no limit	1 hour	no	—	yes	basics
Perfect Writer 2.0	\$199.95	3	no limit	30 min.	yes	very	yes	minimal
Microsoft Word 2.0	\$375	5	2	1 hour	yes	complete	yes	minimal
MultiMate 3.4	\$495	6	no limit	20 min.	yes	very	yes	very
Samna Word III 2.0	\$550	5	2	40 min.	yes	very	no	—
OfficeWriter 3.5	\$445	3	0	15 min.	yes	adequate	yes	complete
Textre 3.1	\$9.95	1	no limit	10 min.	yes	minimal	yes	minimal
Spellbinder 5.3	\$495	6	no limit	2 hours	no	—	yes	minimal
Personal QWERTY	\$99	1	no limit	20 min.	no	—	yes	poor
PFS:Write	\$140	2	1	15 min.	no	—	no	—

TASK 9

Store the file and exit to DOS



Beginning at the top of the file, we stored the document on disk and exited to the A: system prompt. We took advantage of preset printer defaults.

Still, *QWERTY* didn't do too badly on the tasks, particularly on booting and retrieving a file, which it accomplished in half the average time. The opening menu screen is attractive, listing five options for creating, editing, or printing text, calling a directory, and exiting to DOS. A clock and current date appear as nice details. The directory option instantly lists files (without extensions, sizes, or creation dates and times). And just as with *Word*, you can select your file with the arrow keys. Switch-

ing default drives is a snap. But watch out for that powerful Del key, because it removes the selected file from disk.

The *QWERTY* writing screen isn't easy to get used to. At the top is the name of the document in memory, the percentage of memory that is full, and column number markers. The ruler is at the bottom of the screen, as on a typewriter. The cursor rests on the line above. You don't move the cursor to the text, you move the text to the cursor, which never leaves the bottom of the

screen. This attempt to mimic a typewriter goes against the grain of word processing. Worse, the cursor isn't a cursor—it looks like a large lowercase *n*—and it moves along the line below the characters.

QWERTY did poorly on our search-and-replace and block-move tasks, primarily because it uses no keys for large cursor movement. You can move only one character at a time in any direction. Still, using the search function allows you to move fairly quickly around your docu-

Spelling checker	Number of words	On-line help			Menu or command driven	Edit extended character set	Generate table of contents	Generate index	Save block	Maximum text for block operation	Defined by highlight or markers
		How much	How adjustable	Mode oriented							
yes	74,000	extensive	4 levels	no	choice	no	yes	yes	yes	25 pages	both
yes	74,000	extensive	3 levels	no	choice	yes	yes	yes	yes	no limit	both
no	—	extensive	somewhat	no	command	yes	yes	yes	yes	no limit	highlight
yes	100,000	extensive	—	no	both	yes	yes	yes	yes	no limit	highlight
no	—	minimal	on or off	no	both	yes	no	no	no	no limit	markers
yes	100,000	—	—	no	both	yes	no	no	no	unspec.	highlight
yes	100,000	comprehensive	—	no	both	yes	no	no	yes	unspec.	highlight
yes	89,000	comprehensive	—	yes	both	yes	no	no	yes	50 lines	highlight
yes	20,000	good	somewhat	no	both	yes	yes	no	yes	no limit	highlight
yes	50,000	adequate	very	no	choice	no	yes	yes	no	unspec.	highlight
yes	80,000	extensive	—	no	both	yes+	no	no	yes	by memory	highlight
yes	unspec.	extensive	—	no	both	yes	no	no	no	unspec.	highlight
yes	unspec.	good	3 levels	no	command	yes	yes	yes	yes	paragraph	highlight
yes	80,000	adequate	not much	no	both	no	no	no	yes	by memory	highlight
no	—	good	—	no	menu	no	no	no	no	unspec.	highlight
yes	50,000	adequate	not much	yes	both	no	no	no	yes	unspec.	markers
no	—	minimal	—	no	command	no	no	no	no	unspec.	markers
no	—	adequate	—	no	menu	no	no	no	no	100 lines	highlight

WORD PROCESSORS

File-Handling Features

Word Processing	Document size limit	Page or document oriented	Edit multiple files	Rename files	Copy files	Copy/move between files	Filename restrictions
WordStar Professional 3.31	disk	document	no	yes	yes	yes	like DOS
WordStar 2000 1.01	8MB	document	yes, 3	yes	yes	yes	like DOS
XyWrite II-Plus	memory	document	yes, 2	no	no	yes	like DOS
Word Perfect 4.0	disk	document	yes, 2	yes	no	yes	like DOS
Volkswriter Deluxe 2.1	disk	document	no	yes	no	no	some
DisplayWrite 2 1.10	unspec.	page	no	yes	yes	no	must use .TXT
DisplayWrite 3 1.00	unspec.	page	no	yes	yes	no	must use .TXT
EasyWriter II System 4.1	disk	page	no	yes	yes	yes	30 characters
SuperWriter 1.03	32K	document	no	yes	no	yes	must use .SW
Perfect Writer 2.0	memory	document	yes, 7	yes	yes	yes	must use .MSS
Microsoft Word 2.0	disk	document	yes, 2	yes	no	yes	must use .DOC
Multimate 3.4	128K	page	no	yes	yes	yes	must use .DOC
Samna Word III 2.0	disk	document	yes, 2	yes	yes	yes	some
OfficeWriter 3.5	256 pages	page	no	yes	yes	yes	must use .WP
Textra 3.1	40 pgs	document	no	no	no	yes	some
Spellbinder 5.3	10,000 lines	document	no	yes	yes	no	like DOS
Personal QWERTY	70K	document	no	no	no	no	must use .DOC
PFS:Write	20 pages	document	no	no	no	no	like DOS

Printing Features

Word Processors	What you see is what you get	Preview print format	Edit during print	Print part of file	Automatic page numbers	Print multiple copies	Prints without saving	Print labels
WordStar Professional 3.31	mostly	yes	yes	yes	yes	no	no	yes
WordStar 2000 1.01	mostly	yes	yes	yes	yes	yes	yes	yes
XyWrite II-Plus	mostly	yes	yes	pg # to pg #	yes	no	yes	no
Word Perfect 4.0	yes	—	yes	yes	yes	yes	yes	yes
Volkswriter Deluxe 2.1	yes	—	yes	sort of	yes	no	yes	yes
DisplayWrite 2 1.10	yes	—	yes	yes	no	yes	no	yes
DisplayWrite 3 1.00	yes	—	yes	yes	no	yes	no	yes
EasyWriter II System 4.1	yes	—	yes	by page	yes	no	no	yes
SuperWriter 1.03	no	yes	yes	by page	yes	yes	no	yes
Perfect Writer 2.0	mostly	yes	no	by page	yes	yes	yes	no
Microsoft Word 2.0	yes	—	same file	yes	yes	no	yes	yes
Multimate 3.4	yes	—	yes	yes	yes	yes	yes	yes
Samna Word III 2.0	yes	—	yes	yes	yes	yes	yes	yes
OfficeWriter 3.5	mostly	yes	yes	yes	yes	yes	yes	yes
Textra 3.1	yes	yes	no	yes	yes	yes	yes	no
Spellbinder 5.3	no	yes	no	yes	no	yes	no	yes
Personal QWERTY	mostly	no	no	no	yes	yes	yes	yes
PFS:Write	yes	—	no	pg # to pg #	yes	yes	yes	yes

Extension refers to file type	Use files from any sub-directory	Automatic file save	Save file without exit	Automatic backup file	Files readable by DDS	Imports/converts WordStar files	Can swap disks during edit	Can chain documents for printing	Can queue documents for printing	Error beep
for .BAK	no	no	yes	yes	as garbage	—	yes	no	no	no
for .BAK	yes	no	yes	yes	as garbage	yes	yes	yes	no	yes
—	yes	no	yes	optional	yes	no	yes	no	no	yes
no	yes	yes	yes	no	partly	yes	yes	no	yes	no
for .BAK	yes	no	yes	optional	yes	yes	no	yes	no	yes
yes	yes	yes	no	no	as garbage	no	no	yes	yes	yes
yes	yes	yes	no	no	as garbage	no	no	yes	yes	yes
—	no	yes	no	no	yes	no	no	yes	yes	yes
no	no	no	no	optional	barely	no	yes	yes	yes	yes
yes	no	no	yes	no	yes	no	yes	yes	no	yes
yes	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
yes	yes	yes	yes	no	mostly	no	no	no	yes	yes
yes	yes	no	yes	optional	not at all	no	yes	yes	yes	yes
yes	yes	no	yes	no	mostly	no	yes	yes	yes	yes
for .BAK	no	no	yes	yes	yes	yes	yes	no	no	yes
no*	no	no	no	yes	partly	no	no	yes	yes	yes
yes	no	no	no	no	yes	no	yes	yes	no	yes
no	yes	no	yes	no	as garbage	no	yes	no	no	no

Subscript/ super-script	italics	Proportional spacing	Accepts embedded control codes	Prints envelopes	Multiple column printing	Footnotes and/or endnotes	Pause for text entry	Pause for print wheel change	Line spacing control range	Printers supported	Un-supported printer utilities
yes	yes	no	no	yes	no limit	both	no	yes	1-9	24	yes
yes	yes	yes	no	yes	yes, 12	endnotes	yes	yes	2-8 lpi	119	yes
yes	no	yes	yes	no	no	both	no	yes	1-9	33	yes
yes	no	yes	yes	yes	no limit	both	yes	yes	6 or 8 lpi	28	yes
yes	no	yes	yes	yes	no limit	neither	no	yes +	1-66	31	yes
yes	no	no	no	yes	no	neither	no	yes	0.5-3	4	no
yes	no	yes	no	yes	no	footnotes	no	yes	0.5-3	6 classes	yes
yes	no	no	yes	yes	no limit	neither	no	no	1-3	73	yes
yes	no	yes	yes	yes	no	neither	no	yes	0.5-65	11	no
yes	yes	yes	no	no	no	both	no	no	1-3	38	yes
yes	yes	yes	yes	yes	no limit	both	yes	yes	1-132	52	yes
yes	no	yes	yes	yes	no	neither	no	yes	0.25-3	275	yes
yes	no	yes	no	yes	no limit	both	no	yes	0.5-4	27	yes
yes	yes	yes	yes	yes	yes, 3	both	no	no	0.5-3	30	yes
no	no	no	yes	yes	no	neither	no	no	1-3	0	yes
yes	no	yes	yes	yes	yes, 2	both	yes	yes	3,4,6,8 lpi	14	yes
no	no	no	yes	yes	no	neither	no	no	0-9	any	yes
no	yes	no	yes	yes	no	neither	no	no	1,2	13	yes

WORD PROCESSORS

Writing Features

Word Processors	Characters per line	Lines per screen	Change screen colors	Redline key function	Facility for macros	Automatic hyphens	Hard hyphens	Soft hyphens
WordStar Professional 3.31	240	23	yes	F1-F10	no	yes	yes	yes
WordStar 2000 1.01	240	23	yes	no	yes	yes	yes	yes
XyWrite II-Plus	255	22	no	all keys	yes	no	yes	yes
Word Perfect 4.0	250	24	yes	ALT + any key	yes	choice	yes	yes
Volkswriter Deluxe 2.1	250	24	yes	ALT + any key	yes	no	yes	yes
DisplayWrite 2 1.10	455	20	no	ALT + any key	no	choice	no	yes
DisplayWrite 3 1.00	455	20	yes	ALT + any key	yes	choice	no	yes
EasyWriter II System 4.1	255	22	no	no	no	choice	yes	yes
SuperWriter 1.03	250	21	no	no	yes	no	no	yes
Perfect Writer 2.0	250	23	yes	no	no	no	no	no
Microsoft Word 2.0	220	22	yes	no	yes	choice	yes	yes
MultiMate 3.4	150	22	yes	no	yes	no	no	yes
Samma Word III 2.0	250	22	yes	F1-F10	yes	yes	yes	no
OfficeWriter 3.5	156	24	yes	no	no	no	yes	yes
Textira 3.1	80	24	yes	no	no	no	no	no
Spellbinder 5.3	160	25	—	no	yes	choice	yes	yes
Personal QWERTY	80	20	yes	no	no	no	no	yes
PFS:Write	78	22	no	no	no	no	no	yes

Editing Features

Word Processing	Toggle insert/overwrite	Drop-down insert	Move cursor by word	Move cursor by sentence	Move cursor by paragraph	Move cursor by screen	Move cursor to end begin line	Move cursor end begin screen
WordStar Professional 3.31	yes	no	yes	no	no	yes	yes	yes
WordStar 2000 1.01	yes	no	yes	no	no	yes	yes	yes
XyWrite II-Plus	yes	no	yes	yes	yes	yes	yes	yes
Word Perfect 4.0	yes	no	yes	yes	yes	yes	yes	yes
Volkswriter Deluxe 2.1	yes	no	yes	no	no	yes	yes	yes
DisplayWrite 2 1.10	yes	no	no	no	no	yes	yes	yes
DisplayWrite 3 1.00	yes	no	no	no	no	yes	yes	yes
EasyWriter II System 4.1	no	yes	yes	yes	yes	yes	no	yes
SuperWriter 1.03	yes	no	yes	no	no	yes	no	yes
Perfect Writer 2.0	yes	no	yes	yes	yes	yes	yes	no
Microsoft Word 2.0	yes	no	yes	no	no	yes	yes	yes
MultiMate 3.4	yes	yes	yes	no	no	yes	no	yes
Samma Word III 2.0	no	no	yes	yes	yes	no	yes	yes
OfficeWriter 3.5	no	yes	yes	yes	yes	yes	yes	yes
Textira 3.1	yes	no	yes	no	no	yes	yes	yes
Spellbinder 5.3	no	yes	yes	yes	yes	yes	yes	no
Personal QWERTY	yes	no	yes	no	no	no	no	no
PFS:Write	yes	no	yes	no	no	yes	yes	no

On-screen or code formatting	Automatic indentation	Multiple indents outdents	Must reform paragraphs	Change case	Ruler line	Display column number	Display line number	Display page number	Display page break	Multiple or single headers/ footers	Math functions
both	no	yes	yes	yes	yes	yes	yes	yes	yes	single	no
both	no	yes	yes	yes	yes	yes	yes	yes	choice	multiple	yes
both	yes	yes	no	yes	choice	marker	choice	choice	no	multiple	yes
on-screen	no	yes	yes	yes	no	yes	yes	yes	yes	multiple	yes
on-screen	no	yes	yes	no	no	yes	yes	yes	yes	single	no
code	no	no	yes	no	yes	marker	yes	yes	choice	multiple	yes
code	no	no	yes	no	yes	marker	yes	yes	choice	multiple	yes
on-screen	no	yes	yes	no	yes	yes	yes	yes	yes	multiple	no
both	yes	yes	no	yes	yes	yes	yes	no	choice	multiple	no
both	yes	yes	yes	yes	choice	no	no	no	choice	multiple	no
on-screen	yes	yes	no	yes	yes	no	no	yes	yes	multiple	no
on-screens	yes	yes	no	no	yes	yes	yes	yes	yes	multiple	yes
both	yes	yes	no	yes	yes	yes	yes	yes	choice	multiple	yes
on-screen	yes	yes	no	yes	yes	yes	yes	yes	choice	multiple	no
on-screen	yes	no	yes	no	choice	no	no	no	no	single	no
code	yes	yes	yes	no	no	choice	choice	no	no	multiple	yes
code	yes	yes	yes	no	yes	yes	no	no	yes	multiple	no
on-screen	yes	yes	no	no	yes	marker	yes	yes	yes	multiple	no

Move cursor to end begin document	Jump cursor to	Delete by word	Delete by line	Delete by sentence	Delete by paragraph	Delete to end of document	Undelete	Search wildcard	Search backward	Can ignore case in search	Copy move columns
yes	—	yes	yes	no	no	yes	no	yes	yes	yes	yes
yes	*	yes	yes	yes	yes	yes	yes	no	yes	yes	yes
yes	byte	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
yes	**	yes	yes	yes	yes	no	yes	yes	yes	yes	yes
yes	page	yes	yes	no	no	no	no	no	yes	no	yes
yes	page	no	no	no	no	no	no	no	no	no	no
yes	page	no	no	no	no	no	for block	no	no	no	yes
no	page	yes	yes	yes	yes	no	no	no	yes	yes	yes
yes	—	yes	no	no	no	no	no	no	no	yes	no
yes	line	yes	yes	yes	yes	no	yes	yes	yes	yes	no
yes	page	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
no	page	yes	yes	yes	yes	no	no	no	no	yes	yes
yes	***	yes	yes	yes	yes	yes	yes	no	yes	yes	yes
no	page, line	yes	yes	yes	yes	yes	yes	no	no	yes	yes
yes	—	no	yes	no	no	no	no	no	yes	yes	no
yes	—	yes	yes	yes	yes	yes	yes	yes	no	yes	yes
no	—	yes	yes	no	no	no	no	no	yes	yes	no
yes	—	yes	yes	no	no	no	yes	yes	no	no	no

ment, if you're familiar enough with it to know approximately what to search for and *QWERTY* does search and replace both backward and forward.

Although we think it can be done, we tried and failed to merge our two files through the boilerplate merge facility. We were forced to exit to DOS and merge the two files there. However, *QWERTY*'s performance on changing the margins and creating the paragraph indents made up for lost time. To make a change anywhere in a document, all you do is create a new ruler line and insert the letters L, R, and P at the points where you want left margin, right margin, and initial paragraph indents. *QWERTY* blocks the margins in different colors from the writing area, making the margin settings more than obvious. It does not let you move the cursor outside these settings.

Most surprisingly, *QWERTY* placed first in printing an ASCII file to disk, taking only 8 seconds and 2 keystrokes, which is one-sixth of the average, and twice as fast as the next-fastest program. Printing is easier with *QWERTY* than with any of the other programs we reviewed because *QWERTY* comes ready to run with "any printer off the shelf." This claim is true.

The last word on *QWERTY* is this: eventually we got used to the way the program works, but we didn't like it. With a bit of redesigning, *QWERTY* would make a nice home product. But for serious office work, it doesn't even qualify as a temporary replacement.

Personal QWERTY is the only program we reviewed that does not have an index in the manual. The program cannot merge files, search for a character string within a word, or make all word replacements automatically.

FACT FILE



Personal QWERTY

HFK Software
Old Danbury Rd.
Danbury, NH 03230
(617) 259-0059
List Price: \$99

Requires: 128K RAM, DOS 1.1 or later, one disk drive.

CIRCLE 654 ON READER SERVICE CARD

PFS: Write

PFS: Write can handle the home word processing needs of almost anyone, and it is easier to learn and easier to use than any word processor we've seen or tested. Unfortunately, its many limitations keep it from functioning in serious business applications, but it doesn't pretend to be fancy. It's simple, elegant, and basically nonthreatening.

PFS: Write is completely menu driven making full use of the PC's ten function keys. This makes commonly used features such as boldfacing, underlining, and text centering a breeze. Separate and easy-to-follow menus for page formatting and printing go even further toward automating the writing process. And you'll find the occasional sparkling feature in *PFS Write*, such as the fastest, easiest envelope printing facility available. I learned to use the program several years ago as a word processor novice, and when I moved on to something more sophisticated, I left it on my hard disk for addressing envelopes quickly.

With one notable exception, *PFS: Write* ran through the tasks with scores that came in slightly above average, which would have been surprising had we been dealing with large documents. We found its performance was pleasing, given its modest features, and it does little that is unusual enough to merit a full description. It retrieved the document files that were to be edited faster than most programs, came in second place on merging the two files, and

skipped quickly and easily from finished document to printer.

The notable exception in its performance is reformatting the merged file. Changing the margin settings is not difficult and requires no manual paragraph reformatting. But indenting the first line of each paragraph is a completely manual process in *PFS: Write*: in our test, it required 465 keystrokes. That's like a typewriter that only lets you hunt and peck; it leaves your cursor finger tired and annoyed.

But if you're in the mood for a personal word processor with a what-you-see-is-what-you-get attitude, one that is simple enough that you can master it in a week-end, and effective enough that you'd want to spend time learning it, *PFS: Write*'s poor score on the reformatting task should not affect your decision. ■

FACT FILE

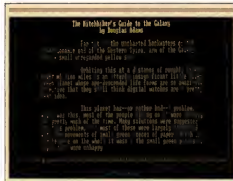


PFS: Write
Software Publishing Corp.
1901 Landings Dr.
Mountain View, CA 94043
(415) 962-8910
List Price: \$140

Requires: 128K RAM, DOS 1.1 or later, one disk drive.

CIRCLE 642 ON READER SERVICE CARD

Phil Wiswell is a free-lance writer and software critic. He is a frequent contributor to PC Magazine. Vincent Puglia, M. David Stone, Robin Raskin, and Charles Petzold aided Mr. Wiswell in testing the programs.



PFS: Write

What you see is what you get with *PFS: Write*, and the screen is attractively clean and simple. Just one complaint: the ruler line belongs on top.

MASS 11

**Can you
argue with
history...**

Is bigger really better?

Dinosaurs became extinct because they couldn't adapt to their changing environment. The word processing industry tells a similar story.

In the B.C. (Before Chips) era of word processing, industry giants offered big, cumbersome, stand-alone systems. Because these giants lacked the flexibility and adaptability to keep up with technology, their systems became obsolete and—like the dinosaurs—are extinct today.

When choosing a word processing package, remember what happened to the dinosaurs. Pick a system that can meet your needs today and can grow with you into the future. MASS-11, a sophisticated word processing package which runs on the entire family of Digital VAX computers, and under MS-DOS on personal computers (including the IBM PC, IBM PC/XT, IBM PC/AT and the Digital Rainbow), continues to meet the growing needs of 35% of the top 50 Fortune 500 companies; 80% of the aerospace industry, and other leading governmental, scientific and educational institutions.

Don't choose from the biggest; choose the best.

MASS 11

For more information on how MASS-11 can meet your office automation needs, contact:



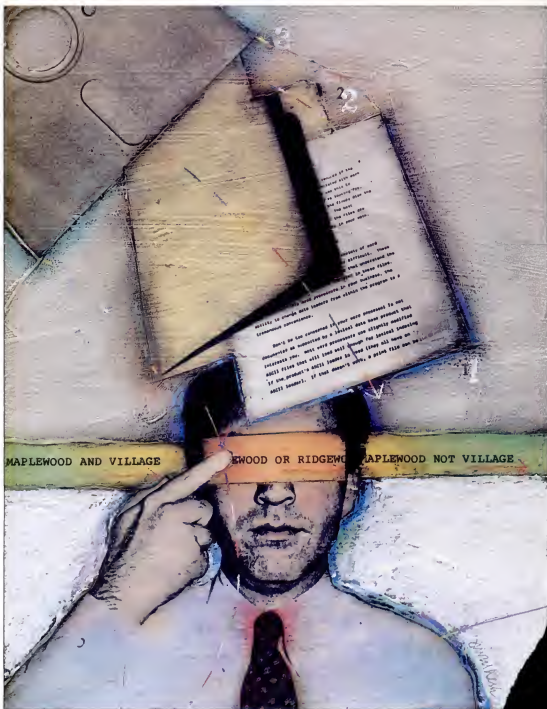
MEC MICROSYSTEMS
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(312) 882-0111 • Telex 703-688

CIRCLE 157 ON READER SERVICE CARD

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Microsystems Engineering Corp. - MEC, MASS-01



If you ask executives or office managers why they still depend on a manually handled, paper-based filing system in today's electronic office, they might say something like, "Without it, it's difficult to put your hands on a report or memo written more than a week ago." Practical experience might lead them to add, "... particularly if you can't remember some detail about it." The bottom line is, "It's much easier to find it in a file drawer, like we always have."

The type of detail they have in mind generally includes the name of the file containing the text, or the identity and whereabouts of the floppy disk on which the file is archived. The 11-character filenames that the PC allows tend to get cryptic when used in naming systems designed for hundreds of files. And floppy disks, notoriously hard to keep track of, can easily end up lying in a disorganized heap at the bottom of somebody's desk drawer.

Some word processing programs for the PC (like *MultiMate* and *DisplayWrite 3*) allow users to enter comments that they can use to help them find what they're looking for when searching through disk directories. But comments may not always be helpful—especially for long reports that cover many topics and can quickly go out

of date as work on them progresses (programmers have faced this problem for years).

One right answer to the question of finding documents in the electronic office is a lexical (word-oriented) database management system (DBMS)—one that indexes and organizes document files based on words or phrases that they contain. Four such programs for the PC are reviewed here: *ZyINDEX*, marketed by ZylAB Corporation in Chicago; *Office Correspondence Retrieval System (OCRS)*, offered by IBM's Entry Systems Division in Boca Raton, Florida; *4-1-1* from Summa Technologies, Inc., in Kentfield, California; and *FYI 3000* from Software Marketing Associates in Austin, Texas.

All four systems are good at solving the electronic filing problem, and any of them can reduce or eliminate the need for file cabinets to store the documents generated by your PC. Better yet, at prices ranging from \$145 to \$395, they're considerably less expensive than renting a warehouse to store your paper files.

LEXICAL ELECTRONIC FILING

A lexical, or word-oriented, database manager organizes document files by keywords—a godsend when searching material from public databases or maintaining large-scale electronic files.

Lexical Technology

Lexical database managers scan text files for words and build a database that indexes those words. Common (or "noise") words such as *the*, *and*, *them*, *he*, *she*, and so on, are thrown away, while unique words and names are saved in the lexical database. Once the database is built, you simply search for the words you want and find out what documents contain them. It's that simple, but there are a few features you should know about.

While all four of these programs allow you to search for more than one word at a time, the more advanced allow you to search for phrases or *sequential* groups of words. A group can be generalized by a Boolean expression such as AND, OR, and NOT. Lexical database management systems that allow Boolean expressions enable you to search for documents that contain, for example, "word1 OR word2" or "word1 AND word2, NOT word3".

An even more sophisticated feature is context searching, which enables you to search for documents that contain words or phrases in some proximity to one another. For example, if you wanted to search for documents about homes in Maplewood, you could search for the word "homes"

LEXICAL DBMS

appearing within 15 words or so of "Maplewood."

What You See

Once the document is found, it helps if you are allowed to take a quick look at it to see if it's the right one. All four products let you browse through the document, and some highlight the words when they find them.

The four systems also let you print the files, but since the printouts aren't formatted the way they would be with a word processor, they can be quite messy in appearance. None of these products let you edit or in any way change the file—that's left up to your word processing program, just as it should be.

Your need to browse through a document may be reduced if the system allows you to enter a comment associated with each document file when you index it. This comment—which quickly tells you if you've found the file you're looking for—can also be used to describe the floppy disk the file is stored on and where the disk is stored. The best implementations display the comments when the files are found, but this feature may not be necessary in your work.

Lexical Compatibility

Maintaining compatibility with the variety of word processing file formats used

on the PC is difficult. These lexical database management systems require specialized data loaders that understand the formatting codes and other quirks in these files. If you use several word processors in your business, the ability to change data loaders from within the program is a tremendous convenience.

Don't be too concerned if your word processor is not on the list of those supported by the lexical DBMS you want. Most word processors use slightly modified ASCII files that load well enough for lexical indexing if the database system's ASCII loader is used. If that doesn't work, a print file can be produced for indexing. The print file can be deleted after the file is in the lexical database, but you won't be able to browse through a document in the print file when a search turns it up.

Using a print file opens up other applications for lexical database systems. For example, spreadsheet and database users can produce print files for lexical indexing, and engineers and other researchers may even be able to index tabular results.

A popular use of a lexical DBMS is indexing and searching large files downloaded from other external sources, such as public databases or courtroom transcripts. Research-oriented public databases often have built-in lexical search facilities, but you may save time (and money) by downloading the file to a PC and searching it

there. Other types of databases have no similar search facilities, so downloading and using one of these products is the only way to search the data lexically.

Another application for lexical databases that I ran into accidentally (by indexing some of my *PC Magazine* programming columns) is for maintaining program information in large-scale development projects. Programs, after all, are just ASCII files, so finding out which programs contain certain variables or subroutine calls is trivial when using a lexical database management system—and much faster than thumbing through piles of compiler cross-reference tables.

Bon Appétit

Capacities vary, but since most lexical databases have a seemingly unending appetite for words, you probably won't run into any problems. Some require a hard disk, or at least an AT's 1.2-megabyte floppy, to store the index files; however, they will index files you have stored on ordinary floppy disks. If search speed is critical, use a hard disk.

The programs reviewed here allow you to maintain several different index databases. This feature may be useful in offices where different departments are using the same word processors, or where you simply have different filing requirements for different applications.

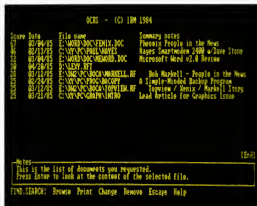


Figure 1: OCRS creates a score that tells you how well matched each file is to your search request. It also displays the file name, disk and directory, and your comment about the file.

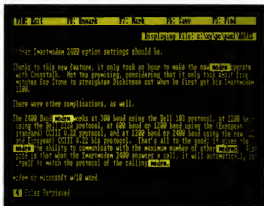


Figure 2: ZyINDEX highlights every word of your search request when you browse through the file. This is a very handy feature when your search request uses ZyINDEX's more complex Boolean features.

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OCRS

IBM's *OCRS* is a lexical filing system that is so easy to start up and use that you'll almost never have to refer to its professional documentation, once you've installed the system and used it once. It's also easy to customize (Figure 1).

You can temporarily or permanently change any *OCRS* options, including the current lexical index file, screen color choices, dictionary of "noise" words, and the data loader for indexing and browsing through files. You can even save several user profiles containing your choices and recall them later (so that different users could use them, for example).

If you run more than one word processor on your PC, the ability to change data loaders can be invaluable. *OCRS* supports several popular formats, including *WordStar*, *XyWrite* and *Microsoft Word* files loaded easily with the ASCII loader. One unfortunate choice in *OCRS*'s design was to use the IBM Revisable Form Document Content Architecture for accessing *DisplayWrite* 2 and 3 files instead of their native formats. You have to maintain two copies of the files if you want to use *DisplayWrite* files with *OCRS* and continue working on them.

OCRS's only flaw is lack of explicit Boolean operators in search specifications. Without them, all searches are based on a Boolean OR, and you may see more docu-

ments listed than you want. The program makes up for this omission somewhat with its unique scoring system, which tells you the files most likely to be the ones you're looking for. IBM doesn't supply the algorithm, but the index used for scoring is influenced by the frequency and position of the search words in the document. When

IBM's *OCRS* is a lexical filing system that is so easy to start up and use that you'll almost never have to refer to its documentation.

filenames are displayed, they're ranked in order on the screen.

The screen display shows the disk, directory, and filename of the file, along with the save date and any comments (of any length) you input when the file was indexed. Indexing can be done individually for some or all files in a directory or by using wild cards in filenames within a directory. *OCRS* is happy to search through any directory on any disk on your system without making you leave the program to change default drive or directory.

OCRS is a well-designed product marketed at a reasonable price. If your require-

ments don't include Boolean searches, its price and easy interface may make it the most attractive of the lexical database managers reviewed here.

ZyINDEX

When it comes to raw search power, *ZyINDEX* stands head and shoulders over everything else on the market. Its search facilities include full Boolean logic but go well beyond that by including phrase and context searching (Figure 2).

The Boolean search request implementation is as natural as typing "Maplewood and Village" to find documents that reference a village named Maplewood. If you want to be sure, type "Maplewood Village," which makes the program look for the entire phrase instead of just each word.

To be doubly sure of what you're getting, type "Maplewood w/10 Village," which triggers the context searching facility. It will find references to *Maplewood* within ten words of the word *Village* and disregards all other occurrences of these words. If you want to disregard references to "Maplewood Road" but select those to "Maplewood Village," you can modify the request to "Maplewood w/10 Village and not Maplewood w/10 Road".

ZyINDEX's user interface is not as easy to get along with as *OCRS*'s, but it rates a solid second. As with *OCRS*, you specify *ZyINDEX* search requests on an open



Figure 3: 4-1-1's approach to specifying your search request is unusual but easy to use. Designed for a hard disk system, it also lets you exit directly into your word processor.



Figure 4: *ZyINDEX* uses paragraphs as basic text units. When you browse a file, you have to look at each paragraph individually, and at all files as one global unit.

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LEXICAL DBMS

screen and can easily modify them any time you're not satisfied with the results. Several files can be indexed at once without leaving the program, and 30-character comments can be used to describe the archive disk or some other information about the file being indexed.

ZyINDEX doesn't give you quite as much information when it turns up the file in a search. It doesn't display the file's save date, and you can find your comments only by running a separate utility program. **ZyINDEX** does display the file's

disk and subdirectory, but only after you elect to browse through it.

You can find and highlight the words used in your search specification when you're browsing through the file, which is a real plus if you're not sure of the exact context. Another bright spot is **ZyINDEX**'s ability to save blocks of text for later use in word processing. This feature is especially handy if you've found a reference you want to quote in full in another document.

ZyINDEX requires you to run separate programs for indexing (**ZyINDEX**) and searching (**ZySEARCH**); while this seems like a major inconvenience when you first start indexing files, it isn't so bad once you use the product regularly. Curiously, the copy-protection system used by **ZyLAB** protects the **ZySEARCH** program but not **ZyINDEX**, which means you have to insert your key disk when time is probably most critical. **ZyLAB** assures me that Release 2.0, which will be available in late June, will not be copy protected.

ZyINDEX Professional, which costs \$295 (\$345 for the non-copy-protected version), can index up to 5,000 files (versus 500 in the standard model). If you want to stun all your friends, get **ZyINDEX PLUS**, which, for \$695, can index 15,000 files and maintain a lexical database of 500,000 words. **ZyINDEX Plus** also works in networks with up to six workstations logged onto the program.

ZyINDEX is a powerhouse product, especially if used for externally produced data. Its user interface could use some work (I'm told improvements will be made in the next release), but if you're a serious user, you'll probably want to spend the extra money for **Professional**. No matter which version you choose, the power can't be beat.

4-1-1

4-1-1, obviously named for the universal telephone information number, combines good indexing and search facilities with a data security system for hard disks. Unfortunately, some flaws make it less attractive than it could be (Figure 3).

The program uses a spreadsheet metaphor to help you find the files you're looking for. You put words to be searched for using a Boolean OR in columns of the spreadsheet, and any words that you want

to associate with an AND operator go into adjacent columns (**4-1-1**'s documentation refers to them as "word boxes").

You're limited to five words in each column; the spreadsheet has three columns across. Although this limit may not be a problem, it seems constricting when you compare **4-1-1** with other lexical database products that have no similar limits. You can modify the search request any time you're not satisfied with the results. A little tricky at first, **4-1-1**'s spreadsheet works well once you get the hang of it.

Some of **4-1-1**'s nicer touches include an ability to search on wild-card specifications included in words. That means you can search for words or names when you are uncertain of the spelling or tense. Old DOS hands will have no trouble with the question mark and asterisk notation used for single- and multiple-character wild cards. You can also search on the file save date or a range of dates in which you think you saved the file you want.

4-1-1 allows you to enter your word processor from the program, although the word processor must be located in the current disk and directory. As it turns out, a flaw in **4-1-1**'s design makes this a relatively useless feature and renders **4-1-1** a weaker entry than it should be.

The flaw is that you cannot access files for indexing that are stored in any directory but the current one. I was astonished to find this restriction in a product billed as "for hard disk users only." You have to change the current directory to the one your files are in and then use a DOS path to access **4-1-1**. If you want to index files in another directory, you have to exit **4-1-1** and start all over. Once the files are indexed, they can be browsed regardless of what directory they're in because **4-1-1** keeps track of that information (although it doesn't display it on the screen).

The rest of the user interface is generally good, although some more **4-1-1** flaws show up in it. There is a menu of current options always on the screen, and help is only a keystroke away. The file comment is always displayed along with the filename and save date, and the search specification appears along with the file display.

There are some problems browsing and printing files once **4-1-1** finds them. The program does not correctly handle ASCII

PC FILE

Office Correspondence Retrieval System (OCRS)

IBM Entry Systems Division
P.O. Box 1328

Boca Raton, FL 33432
(800) 447-4700

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Requires: 192K RAM; one 1.2-megabyte floppy disk or hard disk.

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ZyINDEX 1.3

The ZyLAB Corporation
233 East Erie

Chicago, IL 60611
(312) 642-2201

List Prices: Standard, \$145; Professional, \$295 (non-copy-protected version, \$345); Plus, \$695

Requires: 192K RAM; two 360K floppy disks or hard disk.

CIRCLE 697 ON READER SERVICE CARD

4-1-1

Summa Technologies, Inc.
1919 Sir Francis Drake Blvd.

Kentfield, CA 94904
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CIRCLE 696 ON READER SERVICE CARD

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files that don't use carriage returns to designate line endings (such as *XyWrite* and *Microsoft Word*), and the result is something of a mess, with lines (that are actually paragraphs) truncated and, for some reason, repeated. This may not be a problem if you're working with your own files, but if you're searching through downloaded data or someone else's work, *4-1-1* could actually confuse you a lot more than it helps you.

4-1-1 is a good product that only needs minor tuning to become a superior one. If *4-1-1*'s subdirectory support were stronger and it handled browsing and printing better, it would be an excellent choice for a lexical database, especially at its \$149 price.

FYI 3000

Like the other programs reviewed here, *FYI 3000* works well at indexing text files and locating documents based on word searches. However, it suffers seriously from its CP/M and floppy disk heritage and betrays design flaws common in programs written in an earlier era (Figure 4).

FYI 3000 does not recognize DOS subdirectories, and that's a surprise. In addition, *FYI 3000* changes the filename extension of each file indexed into the lexical database to *Dxx*, where *xx* is a sequence number. The file is not modified in any way, and the documentation offers no reason for the name change. If you should run *FYI 3000* without the files present on the designated disk, the program crashes.

The program is also myopic when it comes to determining what document files or parts of a file can be indexed. Its default mode is to index paragraphs (terminated by a carriage return-linefeed combination) and treat them as separate entities. It can also index larger chunks of text, but you must modify the file to include special start and end codes. One potentially useful by-product of this technique is that you can select certain parts of a document to be indexed for the database.

FYI 3000's method for specifying the words to search for is unusual. Unlike the other programs, which allow you to input your request on an open screen, *FYI 3000* requires you to input each word separately. If you enter a word and a carriage return, a Boolean AND is inserted; a carriage return alone inserts an OR; and an N followed by a carriage return produces a NOT that isn't canceled until the next null carriage return. You cannot modify the current search request and have to start all over just to add or delete a word.

The real penalty of renaming files occurs when you've found what you're looking for. Because *FYI 3000* has renamed the file, it cannot tell you in what file the word was originally stored. Much of the benefit of the lexical database management concept is lost as a result.

FYI 3000 is a bit odd to use, but it does work and is just as good at finding documents as anything else. If you can put up with its old-fashioned and quirky file management, and want to pay \$395 to do it, give *FYI 3000* a shot.

A Final Word

ZyINDEX is the clear choice for professional users who require powerful search capabilities for their lexical databases. A very serious user will want to take full advantage of the product and spend the extra money for *ZyINDEX Professional*; a genuine fanatic will go for *ZyINDEX Plus*.

If your search needs are more modest, or money is a problem, *OCRS* runs a close second because of its superior user interface and design integration. If only I could merge *OCRS*'s front end with *ZyINDEX*'s back end.

John Dickinson is a contributing editor for PC Magazine.

Lexical Database Management Systems

Features	OCRS	Products reviewed ZyINDEX ¹	4-1-1	FYI 3000
Price	\$149	\$145	\$149	\$395
Memory required	192K	192K	256K	128K
Minimum disk(s) required	1-1.2M	2-360K	Hard	2-360K
Copy protection	No	Yes	No	No
Number of files to index	4,000	500	1,000	65,000
Number of unique indexed words	150,000	125,000	No Limit	65,000
Multiple lexical database systems	Yes	Yes	Yes	Yes
DOS subdirectory support	Yes	Yes	No	No
Change modify "noise" word list	Yes	Yes	Yes	Yes
Word search	Yes	Yes	Yes	Yes
Boolean operators in search	Yes	No	Yes	Yes
Phrase search	No	Yes	No	No
Context search	No	Yes	No	No
Date search	No	No	Yes	No
Modify search request	Yes	Yes	Yes	No
Input file comments	Yes	Yes	Yes	No
Display file comments	Yes	No	Yes	No
Browse files found	Yes	Yes	Yes	Yes
Browse for search word or phrase	No	Yes	No	No
Mark and save text block	No	Yes	No	No
Print files found	Yes	Yes	Yes	Yes
File compatibility ²	ASC, WS, RF PFS, EW1, EW2, WP, MM, MSW	ASC, WS, VW ASC, WS PT, SL	ASC, WS PT, SL	ASC

¹Figures are for the standard version.

²ASC = normal ASCII; WS = WordStar; RF = IBM Reversible Form; VW = Volkswriter; PFS = PFS WRITE IBM Writing Assistant; EW1 = EasyWriter I; EW2 = EasyWriter II; WP = WordPerfect; MM = Multimate; MSW = Microsoft Word; SL = Select; PT = Puertext

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AT Multifunction Boards: THE FAST FIVE

Last summer, the makers of PC multifunction boards were worried that their fairy godparent would steal back their billion-dollar pot of gold. Fears ran rampant that IBM would push down its thumb and crush peripheral suppliers simply by building all the extra features the aftermarket companies had made their fortunes supplying into its next personal computer—the AT.

Although the AT's built-in clock and combination parallel/serial card proved that those fears weren't ungrounded, the wonderful new machine ended up opening bigger opportunities for the aftermarket. Instead of just 384K of add-on memory, IBM had created a gaping hole for an official 4 megabytes of memory—or even 16 megabytes—to push the AT's 80286 microprocessor to the limit. Also, the new 16-bit speed of the machine meant that the PC's old 8-bit cards were obsolete and couldn't be carried to newer horizons.

Promises for new AT expansion products came quickly. The actual boards, however, were somewhat slower in drifting onto the marketplace. After all, IBM was moving ATs to the market so reluctantly that demand hardly hit the millions.

Now that ATs are abundant, multifunction boards are legion. *PC Magazine* managed to corral five of these new cards and put them through their paces.

All of the products we investigated shared common characteristics: a data bus 16-bits wide, sockets for all memory chips, length and height that fill an AT expansion slot, and the claim to perfectly match the speed of IBM's raciest micro.

Happily, all the boards performed exactly as expected, but each one proved to

When the AT busted the 640K DOS barrier, it was a sure thing that new megamemory multifunction boards would soon follow. Here, we examine five of these new expansion cards.

have its own personality as well. The fine shades of difference among these cards might just sway your decision about which one to stick in your AT. To help you choose, here is a guide to the Fast Five.

AST's Advantage!

The same no-nonsense approach that made AST's SixPack the bestseller of PC expansion boards shows prominently in the Advantage! board.

The Advantage! features three banks of 18 sockets for memory chips on its main circuit card and an additional three banks on a daughter board. Lay on a second-story daughter board, and you double the socket potential.

AST is quite open-minded about the chips that you choose to fill those sockets. Although chip sizes cannot be mixed within banks, you can fill the three (or six) banks with any combination of 64-kilobit and 256-kilobit DRAM (dynamic random access memory) chips. At minimum power, Advantage! will round out an enhanced AT to 640K with a single bank filled with 64-kilobit chips. Load its two levels with 256-kilobit chips, and you have over 3 me-

gabytes of memory expansion.

Switch settings allow you to specify the total memory on board and the chip sizes that you pick. Another switch lets you split the memory on a single Advantage! card appropriately between the base DOS area and the extended high-memory area.

Yet another switch allows you to turn off the Advantage!'s continuous memory parity-check feature. Although turning off parity checking will prevent your AT from locking up when a parity-check error occurs, you forfeit knowing when a byte accidentally changes in memory and corrupts a program or some data.

With a parallel and a serial port as standard equipment and an additional serial port as an option, Advantage! doubles as a communications adapter. Like that of the IBM adapter, the Advantage!'s retaining bracket sports both a 9-pin AT-style serial connector and a 25-pin parallel connector. The optional second serial port speaks through a 9-pin connector hanging at the free end of a short ribbon cable. A game port is also optional.

Another DIP switch allows you to set the parallel port as LPT2 or LPT3 if your AT has a monochrome display adapter or as LPT1 or LPT2 if it doesn't. Without the optional second serial port, the standard serial port can be selected as COM1 or COM2. When the optional adapter is installed, it becomes COM2, and the standard port becomes COM1.

One of the biggest benefits that Advan-

Clockwise from top left, five new multifunction boards: STB Systems Grand Byte, AST Advantage!, Tecmar Maestro, Sigma Information Systems SMF/AT210, and STB Systems Rio Grande.



FAST FIVE

tage! gives you is documentation. The manual accompanying the board is the best of the five I reviewed. Not only does it clearly explain all the various settings of the board, but it also gives good practical advice on getting other products to work with it. In particular, the wiring advice given for connecting its serial port with various printers is exemplary.

Sigma's SMF/AT210

Rather than the catchy epithet that Sigma Information Systems gives its board, I would christen it the Shoehorn because its design principle appears to be stuffing as

PO-FACT FILE

Advantage!

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Irvine, CA 92714
(714) 863-1333

List Price: \$595

CIRCLE 694 ON READER SERVICE CARD

SMF/AT210

Sigma Information Systems
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Anaheim, CA 92806
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List Price: \$464

CIRCLE 693 ON READER SERVICE CARD

Grande Byte

STB Systems, Inc.
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Richardson, TX 75081
(214) 234-8750

List Price: \$395

CIRCLE 692 ON READER SERVICE CARD

Rio Grande

STB Systems, Inc.
601 N. Glenview, Suite 125
Richardson, TX 75081
(214) 234-8750

List Price: \$549

CIRCLE 691 ON READER SERVICE CARD

Maestro

Tecmar Incorporated
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Solon, OH 44139
(216) 349-0600

List Price: \$589

CIRCLE 690 ON READER SERVICE CARD

much memory and as many ports as possible into a single AT expansion slot. By adding a pair of daughter boards, the SMF/AT210 can add up to 4 megabytes of RAM, six serial ports, and a printer port to your AT, leaving you only a single expansion connector poorer.

The Sigma's heavy load of semiconductors is nearly an inch thick, however, and can overwhelm the adjacent slot when fully decked out. Besides being thick, the SMF/AT210 I tested was long—it was a very tight, tricky fit.

The basic board has space for four 18-chip banks of DRAM in either 64-kilobit or 256-kilobit chips, which can be mixed under some circumstances. All memory in the extended address area must be of a single-chip size.

You can use various complements of chips to round out your AT's full 640K DOS limit using the Sigma board. Machines with 512K system boards use one 18-chip bank of 64-kilobit RAM chips. Those with 256K system boards can use either three banks of 64-kilobit chips or one bank of 256-kilobit chips; one-quarter of that memory is unusable. The remaining DRAM on the Sigma is assigned to the extended memory area.

A memory-expansion daughter board adds four additional 18-chip banks. The memory daughter board runs about two-thirds the length of the parent, starting at the end nearest the front of your computer.

A parallel port is standard equipment on the parent board, configured to appear as LPT1 if your system does not have a monochrome monitor adapter and as LPT2 if your system does have such an adapter. An IBM-style parallel connector (female DB-25) protrudes from the retaining bracket of the Sigma card.

Also on the main board is the single standard serial port, configured as COM1. This port can be configured as either DTE or DCE (so you can plug another computer or terminal into your AT without a null-modem cable). You set the default communications parameters of this port using an on-board DIP switch. Some operations—specifically DOS's MODE command or BASIC's OPEN statement—will override these hardware settings.

A short ribbon cable terminating in an AT-style 9-pin serial connector is provided,

into which you can plug your communications device. No mounting scheme is provided for this connection, however.

A second, optional serial port, identical to the first but assigned as COM2, can be ordered on the main card. Additionally, an optional second daughter card, occupying the area directly above the AT's expansion connectors, will add up to four more functionally identical serial ports. All these ports use identical 9-pin cables terminating in AT-style serial connectors. Fully packed with ports, the Sigma resembles an octopus—or at least a hexapus.

The documentation accompanying the SMF/AT210 was sufficient for its purpose: apparently accurate but hardly memorable. In fact, after I installed the board, I never needed to give it a second thought.

STB's Grande Byte

If you bought your AT already enhanced, extra parallel and serial ports could be an unwanted addition to your system, one that you're stuck paying for with most AT multifunction boards. Not so with the memory-only Grande Byte. With this card, you pay only for what you want and need—more memory.

STB gives you several options for expansion with various combinations of 64-kilobit and 256-kilobit RAM chips. Your options depend on the amount of memory already in your AT. If you have 256K of RAM on your motherboard, the Grande Byte can add either 640K, 1,408K, or 2,560K to your system. With 512K on your system board, the Grande Byte can be configured for 640K, 2,176K, or 2,560K; should you add IBM's 128K option to that, however, you can't use Grande Byte's 2,176K option.

Although all of those options are available from the factory, you can also reconfigure the Grande Byte's memory with a DIP switch. For instance, you can buy a smaller configuration that uses only 64-kilobit chips and later upgrade the board with 256-kilobit chips.

In any case, you can split the Grande Byte memory between DOS and the expansion memory area. Moreover, you can use one or more Grande Byte cards in conjunction with other boards to give your AT incredible amounts of expansion memory. A DIP switch allows you to select the start-

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| 4. Flexibility. | Can't always work with a Hercules Graphics Card. | Always works with a Hercules Graphics Card by means of a software switch. |
| 5. Warranty. | 90 days. | Two years. |

Any one of these five features is enough reason to buy a Hercules Color Card. But perhaps the most convincing reason of all is just how easy the Hercules Color Card is to use: "Right out of the box, the Hercules Color Card goes into an empty expansion slot, ready for you to plug in. . . and go to work—no jumpers, no software. For most applications, it's just that easy." PC Magazine.

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ing address used by the memory in the expansion area.

The Grande Byte is a single-level card that fills a single expansion slot. Although design and construction are of high quality, the review sample inexplicably arrived safely in its undamaged, shrink-wrapped box with its retaining bracket strangely bent. After I adjusted the bracket, the board fit in the AT and worked flawlessly.

STB's Rio Grande

The basic equivalent of a PC multifunction board updated to the AT's 16-bit bus, the Rio Grande is a one-board way to expand your AT to the limits of DOS. Its three 18-chip memory banks can be populated with 64-kilobit chips to stretch your entry-level 256K AT to its DOS capacity, or the sockets can take your computer into its extended address range if your AT is endowed with more than 256K of RAM or if you use 256-kilobit chips in the card.

Normally, all Rio Grande memory-chip sockets are filled with the same size chip. However, if your AT has 512K of RAM on its system board, STB allows you to configure the Rio Grande with one bank of 64-kilobit chips and two banks of 256-kilobit chips. All memory banks need not be filled, so you can add additional memory, one bank at a time, as your system requires it or as you can afford it.

As with the Grande Byte, you can set the 128K boundary within the AT's 16-megabyte addressing limit at which the Rio Grande's expansion memory will begin. This means you can use the Rio Grande in conjunction with virtually any other memory card.

The Rio Grande also functions as a substitute for the AT communications adapter with both parallel and serial ports on board. As with the communications adapter, a 9-pin AT-style serial connector and a 25-pin printer connector adorn its retaining bracket.

A DIP switch allows you to set the parallel port off or as LPT1 or LPT2 if your AT has no monochrome display adapter; LPT2 or LPT3 if it does have one. You use jumpers to choose nonstandard port interrupts for special applications.

The Rio Grande goes beyond mere substitution, however. You can also add a second serial port and a game adapter to its I/O

armada. Both additions require ribbon-cable extensions since no connector space is available on the Rio Grande retaining bracket.

The standard and optional serial ports are assigned as COM1 and COM2, respectively, and each can be individually disabled by setting a DIP switch. You can assign the standard serial port as COM2 if your system already has a COM1 device

by setting a switch and moving a jumper.

The only reservation I have about the construction of the Rio Grande is the mounting of the crystal that controls the serial port's data rate. The large metal can is merely bent over on its leads against a patch of resistors on the board. Of course, the deficiency is mostly aesthetic, and once you screw your AT together, you'll never notice the leaning crystal.

Differing Philosophies

Whether you prefer the simple single-story boards or the split-level stacked cards, the main goal is the same: Stuff the slot with lots of memory.

Probably the biggest difference between the five AT multifunction boards I tried is the single element of design philosophy. Although all share the common goal of putting as much memory as possible into a single slot, the paths each takes to get there are varied.

Most makers take the high road, piling one board atop another to get more space for the multitude of memory chips. Even with the combined space savings of new 256-kilobit memory chips and larger cards for the AT, however, fitting the full 4 megabytes that IBM lists as the AT's capacity takes more than a single card. Consequently, most manufacturers double-deck their memory boards to achieve maximum memory configurations.

Some manufacturers, however, take the low-level route and staunchly stick with single-level boards. Their contention is that the closely stacked double-deckers are bad for your chips, bad for your computer, and bad for your peace of mind. Excessive temperatures might make a memory chip (and your whole system) suddenly and unexpectedly fail.

The primary argument the opponents of double-decking use against stacked boards is very sound. By limiting air circulation, and therefore the exchange of heat, closely stacked boards can put the semiconductors in the middle under severe thermal stress. However, the high roaders will quickly point out that if the stacked board is properly designed to al-

low the flow of cooling currents, heat build-up won't be a problem.

My casual experiments conducted with a loaded Sigma Information Systems SMF/AT210 showed the central chips did not get appreciably warmer than those on the upper layer. Even after hours of use and misuse, the chips in the middle of the two-board sandwich actually ran cooler than a few of the logic chips that resided on the same board when there was no stacking.

A more important consideration is thickness. With the 0.8-inch slot spacing in the AT, a stacked board can be a tight fit and can restrict your options for the adjacent slot, perhaps to a short board. (The Sigma board measures $3\frac{1}{2}$ of an inch bottom to top.) Of course, while thickness does defeat the primary purpose of putting everything on a single card, a space shortage should only be a problem when your AT nears its expansion capacity.—Winn L. Rosch



READ ONLY



A review of the IBM Personal Computer Family, Vol. 2 No. 2



WHAT'S THE PROGRAM?

Meaningful dialogue. There are two programs from IBM that can greatly improve the quality of our running dialogue with computers. They are the IBM EZ-VU Runtime Facility and the IBM EZ-VU Development Facility.

Think of the EZ-VU Runtime Facility as a mediator in your IBM PC conversations. It handles the exchange of commands and information between you and your application programs through predefined screens. It can give you a single consistent interface with applications written in a variety of languages.

In short, the EZ-VU Runtime Facility lets you concentrate on the essentials of the job you're doing.

If your job is program development, the IBM EZ-VU Development Facility can help you write menu-driven applications—or revise existing ones—that are both sophisticated and easy to use. It incorporates a screen design tool that works through the function keys on your IBM Personal Computer, so there are no special codes and commands to slow down your design work. EZ-VU also helps

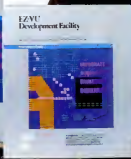
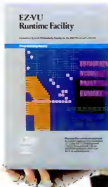
make fast work of testing and revising your screen designs.

Two additional points. Both of these EZ-VU programs benefit from years of success by similar dialogue management programs in IBM host MVS, VM, and VSE operating environments. And both run under the IBM TopView program, which allows you to run a number of software applications concurrently.

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usual combination of speed and accuracy. Optimization techniques and features such as a full symbolic interactive debug facility are similar to those usually found only in IBM VS FORTRAN and other mainframe FORTRAN compilers.

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The last word. Or perhaps we should say the last word to date. The new IBM DOS Technical Reference manual contains just about everything you'd want to know about the IBM Disk Operating System Version 3.1 and previous versions 2.1 and 3.0.

That's not to say that new improvements and information won't appear in the future. They will, and you'll be kept abreast of such developments. An update information service is included in the manual's purchase price. So you'll always have the last word.



You then have direct access to the data and programs on the host computer. So if you're working on a branch-office quarterly report, you no longer have to wait while essential data from a headquarter's computer is sent to you and copied for your use. There's also a redirector function that allows you to place the data on a file server for distribution to other stations on your IBM PC Network.

In addition, when the program is installed on an IBM Personal Computer in an IBM PC Network, that PC can act as a communications gateway for other members of the same network. If members of a network need to communicate with more than one IBM host computer—or with different applications on the same host—multiple gateways can be attached to a single IBM PC Network.

And an IBM PC with the IBM PC Network SNA 3270 Emulation Program installed can still be used as a network station doing standard PC work.

You could, for instance, use your IBM PC to create a data set on a host system. You could also create a word processing project on your IBM PC using DisplayWrite 3*, switching easily back and forth between them without terminating either session. The IBM PC Network SNA 3270 Emulation Program also allows you to transfer graphics printing jobs from the host to an IBM PC with a graphics printer attached.

Stand-alone assistance. There's a new addition to the IBM Assistant Series to help handle stand-alone communications between your IBM Personal Computer and a host machine or another IBM Personal Computer. IBM Mainframe Communication Assistant software includes a 3101 and 3270/78/79 terminal emulator for your IBM PC, plus a set of host computer support programs for VM/CMS and MVS/TSO systems.

Mainframe Communication Assistant has the same easy menu structure as other members of the Assistant Series, such as Writing Assistant and Planning Assistant. And it offers a number of unusual features to simplify your communications work.

It can, of course, speedily transfer files between host and PC for PC

Quiet, please. This printer technology is as advanced as the people that use it. It's versatile, compact, and might make a printing press in the back room. In this case, it's a new method of printing development. Printer technology strike the page with a unique multi-layer ribbon and print mechanism that virtually "paints" characters on the paper.



IBM Quietwriter® Printer offers advanced printer technology and unusually low operating noise level. Shown with sample of letter-quality printing.

and PCI. After you've worked with the host file, Mainframe Communication Assistant lets you transfer only the changes you've made—rather than the entire file—back to the host computer.

And, as a member of the Assistant Series, Mainframe Communication Assistant allows you to integrate mainframe database information into Filing Assistant files. You're then able to transfer that information to other members of the Assistant Series, saving the time and effort of reentering data that has been stored on a mainframe computer.

*Follow the proper installation instructions in the IBM PC Network 3270 Emulation Program documentation for DisplayWrite 3.



HARDWARE NEWS

Quiet, please. There's been a quiet revolution in printer technology. The IBM Quietwriter® Printer is as ad-

vanced as the computers it serves. It's versatile, compact, remarkably quiet, and produces work that might make people think you've got a printing press in the back room.

In this case, the spark behind the revolution is a new method of resistive ribbon, non-impact printing developed by IBM. The "Quietwriter" Printer replaces print elements or hammers that strike the page with a unique multi-layer ribbon and print mechanism that virtually "paints" characters on the paper.

As a result, the "Quietwriter" Printer produces superb, letter-quality printing on a variety of papers and in a wide range of type styles. To change type styles you just unplug one font module and plug in another. And because the "Quietwriter" Printer can accommodate two font modules, you can have two type styles online at once.

The "Quietwriter" Printer also allows you to produce a wide array of character graphics either separately or to highlight reports and correspondence.

And it does all of this very, very quietly. At 50 dB, the IBM "Quietwriter"™ Printer* makes less noise while printing than many printers make while idling. That means you can put the "Quietwriter" Printer wherever it's most convenient; it won't disturb either your telephone conversations or your train of thought.

Unconventional ability. IBM also makes conventional printer technology seem anything but conventional.

Consider the IBM Wheelprinter,™ for example. Its printwheel is designed to provide sharp, clear letter-quality printing even after millions of impressions. And the printwheel is easy to change, which is important because there's a selection of over 500 printwheels to choose from. The Wheelprinter's standard features also include both automatic sheet feed and continuous forms feed—optional on many other printers.

The Wheelprinter is reliable enough to take on high-volume office work. It even works with two types of ribbons to suit the requirements of different types of jobs. There's a single-strike ribbon for finished reports or correspondence. For more routine jobs like purchase orders or internal memos, you can use a longer-lasting, lower cost multi-strike ribbon.

The Wheelprinter has equally impressive qualifications as a home printer. To begin with, it's remarkably easy to use. The Wheelprinter's integrated paper path provides reliable cut-sheet printing and allows it to do much faster work than you might expect from a 25cps printer. And its acoustically engineered cover makes the Wheelprinter an exceptionally quiet impact printer.

Maybe "conventional" isn't the right word at all.

*These are just two of the various printers available from IBM for the IBM Personal Computer Family.

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TIPS AND TECHNIQUES

Stop action. If you occasionally sit frozen while screen after screen of information rolls by too fast to read, take heart. There's more than one way to stop that cascade of data and view one screenful at a time.

When listing the directory of a diskette or fixed disk, the command DIR/P will do the trick. After finishing with one screen, press any key to bring up the next.

To slow down the listing of a text file, you could use the CTL/NUM LOCK keys, but that involves keeping both hands on the keyboard and an eye on the screen.

Instead, check your DOS directory listing to make sure the DOS utility program MORE.COM is available. Then, at the DOS prompt A>, type the command line MORE<filename and press enter.

NOTE: be careful to use "<" and not ">": if you enter the wrong one, you'll destroy your text file.

To view a file called PCWRITE.DOC, for example, enter MORE<PCWRITE.DOC. That will list a single page of text on your screen and display the message —MORE—. Again, press any key to view next screen.

Voilà, perfect control.

Thanks for this tip to Chuck Harrington of the Athens, Ohio, area IBMPC Users Club.

Thanks also—and apologies for omitting a note of credit in the last issue of *Read Only*—to Ed Smucker of the Redondo Beach, California, Greater South Bay User Group for his tip about setting screen colors.

For more information about IBM Personal Computer products discussed in this issue of *Read Only*, see your Authorized IBM Personal Computer Dealer or IBM Product Center. To learn where, call 800-447-4700. In Alaska and Hawaii 800-447-0890.

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Tecmar's Maestro

Admiring about the evils of multilevel expansion boards, Tecmar has squeezed as much memory as possible onto the one-level Maestro. A curious result of this limit is the Maestro's haphazard arrangement of chip sockets into banks. A partly populated board looks as if memory chips were popped in almost at random.

Despite or because of this unorthodox board layout, the Maestro packs five 18-chip socket banks into a space that most manufacturers find sufficient for only four—enough sockets for up to 2.5 megabytes of 256-kilobit chips. Alternatively, the sockets can be filled with banks of 64-kilobit and 256-kilobit chips.

Although the *Installation Instruction* pamphlet accompanying the Maestro gives only rudimentary instructions for adding the board to 256K and 512K AT systems, the *Technical Reference* manual also covers the possibility of IBM 640K systems. In any case, the memory on the Maestro is split, so that after the DOS 640K limit is filled, the remaining memory is assigned to the expansion area.

Tecmar includes parallel and serial communications ports on the Maestro. You can assign the parallel to the same address as the IBM Monochrome Display Adapter printer port or as LPT2 by setting a DIP switch. By setting another DIP switch, you choose COM1, COM2, COM3, or COM4 (the last two assignments are not recognized by DOS) for the serial port; a set of jumpers determines whether the serial port acts as a DTE or DCE device. Other jumpers allow finer tuning to match the Maestro to the elaborate AT system.

However, the *Installation Instructions* pamphlet doesn't warn you that you might need to set these switches or jumpers. Although Tecmar's purpose seems to be giving inexperienced PC users an easy time with its simplified and clearly written installation instructions, you've got to read the forbidding *Technical Reference* manual if you want to be sure everything will work with the rest of your AT.

Thank You, Tecmar

One feature to thank Tecmar for is the full-size serial connector provided as standard equipment, in addition to the AT-

style 9-pin jack on the Maestro's retaining bracket. A male DB-25 jack—the standard IBM PC serial connector—is mounted on a second retaining bracket, which Tecmar recommends installing in the slot adjacent to the Maestro. (Yes, that means Tecmar advises using two slots for a single-level board. Those folks are really serious about good air circulation.) This free extra connector can save you the price of IBM's adapter cable. The parallel port uses a 25-pin connector, which is mounted on the Maestro's own retaining bracket.

Despite the strangely divided instructions, the Maestro came to life as soon as I

added it to my AT, and it worked flawlessly thereafter.

The worth of all five of these new AT expansion boards will be proven when new challenges, new software, and even new operating systems appear. Load your AT with XENIX and custom-built software (the XENIX application library is still about as large as Scrooge's heart), hang three terminals on its serial ports, and you'll need every byte of memory these boards give you. ■

Winn L. Rosch is a contributing editor for PC Magazine.

Where Will All the Power Go?

You've got heaps of memory, so now what? Unfortunately, software that will address the AT's expanded capacity doesn't exist yet.

Once you have 4 megabytes of memory, you'll want to put it to use. Alas, I know of no commercial software that makes use of the AT's expansion memory, the memory above the base area of 640K. Run CHKDSK with any of these expansion products, and no matter how stuffed with silicon the board may be, the DOS program will stop searching for bytes after it finds its allotted 640K. The only exception to this search limit is the VDISK disk emulator that accompanies DOS 3.0, which will happily venture into the untried territory with its E option.

The current high-memory software shortage is more noticeable when you discover that the new AT multifunction boards generally lack the free bonus software that accompanies most plain PC expansion products. Although nearly every 8-bit multifunction board comes with at least virtual disk emulation and print-spooling programs, these boards arrived packed with nothing but instructions.

Only the Maestro was delivered with software—Tecmar's *Treasure Chest* package. Even though the documentation of that package has been updated to include the AT, only two programs—the

print spooler and the memory-testing utility—out of the 20 or so functions of the *Treasure Chest* package can address memory above 1 megabyte.

Undoubtedly, as more and more ATs are put into service, new high-powered programs will become available to make use of the machine's bountiful memory and processing power. Today, you might just want to invest in the basic board with sufficient memory only to flesh out DOS's 640K limit. Then, when you want to put a program to work that uses the AT's expansion memory, buy an extra handful of memory chips.

In the face of rapidly falling prices for 256 memory chips, such a strategy makes a good deal of sense. Already, the price-equivalent capacities of 64- and 256-kilobit chips is near parity. With the price of the smaller chips near rock bottom, the price advantage of the big-memory chips can only improve.

—Winn L. Rosch





One Small Plus for CPAs

CPA+, a 1-2-3 based accounting package, helps spreadsheet-dependent PC users handle small-business accounting chores.

The spreadsheet has been a magic carpet into the world of computers for most PC users in business. In fact, many small-business owners learned to use a spreadsheet before they used any other programs on their new computers. And many of them have been reluctant to move on to more complex and perhaps less understandable computer tools.

More than a few PC users will address any problem with a spreadsheet solution. Intimidated by databases and vertical market packages, they cling to their old friend the spreadsheet. Those handy with the immensely popular 1-2-3 find using it to do accounting chores for very small businesses to be both logical and efficient. So with the 1-2-3 user base estimated at over 1 million, it was only a matter of time until someone came up with an integrated accounting system based on it.

The demand for a good 1-2-3-based accounting template encouraged GNP Development Corporation to introduce a surprisingly comprehensive accounting package that uses Lotus's powerful spreadsheet. This package, CPA+, is the first of its type we've seen that helps you maintain a general ledger, as well as accounts payable, accounts receivable, and payroll records. These four accounting modules are fully integrated.

CPA+'s packaging bears a striking

physical resemblance to that of 1-2-3. The software is contained on two diskettes, the system disk and the data disk. The files on the system disk contain subroutines in the form of 1-2-3 macros that enable you to enter and maintain your accounting records, create a variety of useful reports, and print checks. Also included is a batch file that reassigns some of the keyboard keys for special CPA+ functions. The data disk has only three files: the large main worksheet that holds the transaction details, all the menus from which you operate the system, and quarterly and year-to-date summary worksheet files.

GNP representatives maintain that CPA+ is designed for small- to medium-size businesses with fewer than 48 employees and less than \$5 million in sales. Actually, if you have only 256K RAM, you'll be able to process payroll transactions for no more than 8 employees. A full 640K RAM enables you to handle transactions for 48. The RAM available to CPA+ also governs the ultimate number of transactions and general ledger accounts that you can enter into the system. With 256K RAM you get 112 rows in the worksheet, limiting you to about 100 entries per journal. For each additional 128K that you devote to CPA+, you pick up about 200 additional rows on the worksheet. An option allows you to expand the size of your

worksheet to the maximum of about 700 rows if you have a full complement of 640K RAM available. CPA+ can keep track of up to 700 vendors and an equal number of general ledger accounts and deposits, payables, and receivables records for each accounting period.

Memory really shouldn't be a major constraint, however. If it is a problem, your business probably requires a more traditional accounting package than CPA+.

In addition, running certain functions for a very large spreadsheet such as that used by CPA+ could take an hour or two. If you need to process more than say 300 to 400 transactions per journal each accounting period, a spreadsheet-based system like CPA+ may not give you enough structure and control.



CPA+
GNP Development Corporation
1244 East Colorado Blvd.
Pasadena, CA 91106
(818) 577-2550
List Price: \$695

Requires: 256K RAM, two 360K disk drives or one drive with a hard disk; DOS 2.x and Lotus's 1-2-3, Version 1A.
CIRCLE 689 ON READER SERVICE CARD

The CPA+ worksheet has nine distinct areas, or cell ranges, arranged side by side, eight of which represent the different journals. The ninth is set aside for macros (see Figure 1).

Command Structure

You're probably familiar with the I-2-3 command line that appears at the top of your screen when you press the slash (/) key. This function and all the I-2-3 commands work in CPA+ just as they do in I-2-3. CPA+ gives you another command line, however, when you hit the backslash (\) key. Figure 2 shows a small portion of the CPA+ command "tree," which may appear a bit overwhelming at first when seen as a whole. However, with a little experience, you'll be able to find and execute quickly the function that you want.

CPA+'s easy-to-use command structure is probably its greatest strength. The main menu options include: Move, to move quickly from one journal to another; Enter, to enter accounting transactions into any of the journals and to maintain master records such as the chart of accounts and the employee lists; Report, to produce any of CPA+'s many accounting reports; Forecast, to produce a simple projection of business activity based on your cash disbursements, cash receipts, sales, or purchases journals; Update, to allow you to update certain system control information such as company name, spreadsheet size, and so on; Print, to print checks, labels, or envelopes; Graph, to produce a line, bar, or pie chart gleaned from the information in the most recent journal report that the system prepared; and Save-Quit, to (you guessed it!) save your spreadsheet and exit the system.

From Enter, you can choose to enter transactions into any of the six accounting journals. If you want to report deposits in detail and unsorted, you would simply type \RDU as in I-2-3. Easy enough.

We found that the CPA+ commands do a surprisingly wide variety of accounting tasks within the limitations of the spreadsheet framework. However, you'll soon figure out (perhaps accidentally) that you can also use I-2-3 commands on much of the worksheet. In fact, the Advanced Topics section of the manual warns that performing certain functions—even certain

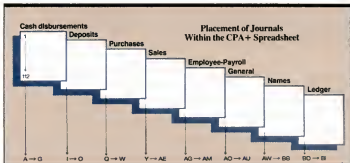


Figure 1: In the upper lefthand corner of the spreadsheet, occupying columns A through G and rows 1 through 112 is the cash disbursements (checks) journal. (More rows will be utilized if you allocate more than 256K of RAM to your CPA+ spreadsheet.) Next to it, in columns I through O, is the cash receipts journal. Continuing onward to your right you will find, in order, the purchases, sales, payroll, and general journals. The seventh area is called the "names" journal and is merely a database for you to keep the names and addresses of your vendors, customers, and employees, which you can sort and retrieve for printing checks, mailing labels, and envelopes. The eighth area is the general ledger, which contains the complete chart of accounts with beginning and ending account balances for each account. The remaining area (to the right of the eight journals) is a "no man's land" of CPA+ macros.

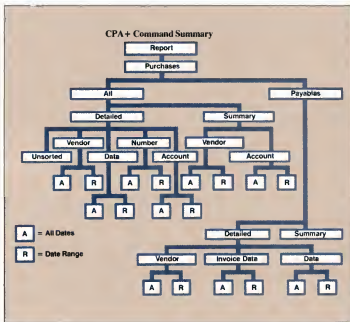


Figure 2: A small portion of the overall CPA+ command tree. Shown is the Report-Purchases segment. The entire command tree structures for both CPA+ and I-2-3 are exhibited on a "Quickstart Guide" that is provided with the package. This guide helps you gain an understanding of the system quickly.



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CPA+

1-2-3 commands—may have a detrimental effect on the integrity of your worksheet. To the far right of the spreadsheet (over in "Macro City"), you may, if you wish, alter any of the many complex macros that make up the logic behind CPA+. But beware: This possibility leaves the door open for a malicious or incompetent user to wreak havoc in your accounting records.

The sophistication of some of CPA+'s macros emerges in a dazzling on-screen "light show" when you invoke one of the more complex accounting functions. The way the system builds and sorts a report, for instance, is impressive considering how much is being done within the confines of a single spreadsheet.

System Setup

One of the first steps in setting up any accounting system is to design the general ledger chart of accounts. CPA+'s request to enter "type of business" (retail, manufacturing, or service) implies that alternative account listings may be available. Actually, the program offers only one type of chart, which you can modify to some extent. Eleven of the predefined accounts are mandatory. For each account you must specify a 5-digit number, a 15-character code that you can use interchangeably with the 5-digit number when you enter account distributions, and a 72-character account description. You can add accounts within certain predefined ranges. Very small businesses considering CPA+ should not find that this "closed" account structure constitutes a major limitation. If you're converting from a manual ledger, in which you've used a limited number of account descriptors (without account codes), you can use these same descriptors for CPA+'s 15-character account code, thus easing your conversion to the newly imposed account structure.

Once you've finished customizing your chart of accounts, you can enter beginning balances for each account. Take care in entering this data: You can inadvertently leave your beginning "trial balance" out of balance, and the system won't warn you. Needless to say, that wouldn't be a good way to start off your new set of books!

The next step in setting up the books is to enter your existing, or open, accounts

receivable and accounts payable balances. Setting up all the unpaid bills as balance-forward line items in the purchases journal and all uncollected invoices in the sales journal is a relatively straightforward process, but the payroll setup requires you to review and modify tax tables in a separate worksheet for your own tax jurisdictions. Only California and federal jurisdiction tables are provided.

Processing Transactions

Enter all transactions directly into the appropriate source journals, much as you

The sophistication of some of CPA+'s macros emerges in a dazzling on-screen "light show."

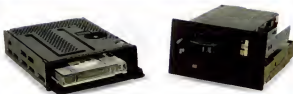
would in a manual system. The program's six journals constitute the "books of original entry." Entering transactions into any one of the journals is as similar to traditional accounting software as a spreadsheet can allow, thanks to the powerful macros that control the CPA+ routines.

Editing previously entered data differs from the procedure in a more traditional accounting package in an irritating way. CPA+ lets you enter data either by using the data entry facility or by using 1-2-3 to move the cursor over to the data you'd like to change. If you use the more structured CPA+ facility, you'll soon find that many of the fields in the line you're correcting will have to be re-entered. For example, say you've entered the wrong invoice number for a sales transaction: You'll have to direct CPA+ to move you to the appropriate transaction, then re-enter most of the data for that line manually. More traditional systems oblige you only to enter the item of data to be corrected.

Correcting data by using the 1-2-3 facility is much easier, but you must be sure that your entries are in the correct format, or your system may not work properly.

Real care must be taken when editing certain data. The operating instructions read: "Whenever you use the Backslash Enter Checks command (\EC) or any other command to edit a previous entry, make sure you also edit any corresponding entry

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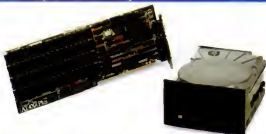
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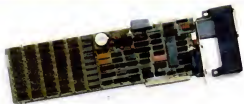
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CPA+

in another journal. For example, when you use the Backslash Print Checks command (PC) to print a check for a payable in the purchases journal, CPA+ creates a corresponding entry for the check journal. If you then edit this entry, you must also edit the original entry in the purchase journal."

Your reaction to a first reading of this passage might well be confusion. However, the complexity that dealing with corrections necessitates results from the enormously ambitious task that GNP has taken on: developing a comprehensive and integrated accounting package using only a spreadsheet.

Accounting Transactions

Purchases may be entered into the purchase journal if they're set up as an amount payable to a specific vendor, and they can be charged to more than one account. Cash disbursements can then be entered for checks already paid by manual check. Otherwise, you can enter disbursement data to have the system cut a check immediately. A record is logged directly to the check journal. Checks (cash disbursements) are also "automatically" produced for payments due through the Print Checks command. A disbursement can be charged to a specific balance due or to any other general ledger account.

Sales can be entered in a similar fashion into the sales journal. Cash receipts (deposits) can then be entered and applied against a specific sales invoice or against any of the general ledger accounts.

CPA+ allows you to enter a modicum of employee "personnel" data and the hours a particular employee worked during a given time period. In reviewing the payroll portion of CPA+, we convinced ourselves that it could be useful. On the other hand, experience has shown us that in many cases, even more sophisticated PC-based payroll systems (including some standalone accounting packages) fail to provide a capable and easy-to-operate payroll alternative, so CPA+ does not suffer by comparison. However, because CPA+'s payroll facility is relatively weak, we suspect that the greatest value most buyers will accrue will come from the other accounting capabilities.

CPA+'s reporting functions are quite extensive--again considering that the

whole program is based on a single large spreadsheet. The Report option from the main menu produces listings of all transactions journals, plus your names journal and the ledger. Figure 2, the command summary "tree" for the Report-Purchases command, shows the flexibility you're given in listing purchase transactions. Ledger reports include a balance sheet, an income statement, a list of financial ratios, as well as detailed and summary listings of your individual financial accounts.

Using the Print option, you can print checks (the check forms used by CPA+ are available from several national computer forms houses), payroll checks, W-2 forms, and mailing labels or envelopes for the list in your names journal.

CPA+ offers resources that make it easy to learn and use. We recommend the on-line tutorial as a quick introduction to the system's accounting processes. If you use Lotus's 1-2-3, you'll find it relatively easy to learn CPA+.

CPA+ can provide significant accounting capabilities for a very small business. If you're a small-business owner already using 1-2-3, you may want to use it to automate your bookkeeping chores—particularly if you're using a spreadsheet of your own design. Significant effort has gone into the product to make it as versatile as possible. Further development of this spreadsheet is probably not a task you'd like to undertake. The sophistication of the macros it uses are well beyond the abilities of most casual PC users.

However, the limitations that result from implementing a transaction-based accounting system within a spreadsheet format are significant. CPA+ may increase your flexibility to a degree—letting you edit your data freely with 1-2-3—but you'll be giving up the greater structure and control that a more traditional accounting product allows.

Despite that fact, take a look at CPA+. After all—1 million 1-2-3 users can't be wrong.—Michael A. Yesko and G. William Dauphinais

Michael A. Yesko is a manager in Price Waterhouse's Management Consulting Services division in New York. G. William Dauphinais is an MCS partner in the company's Sacramento office.

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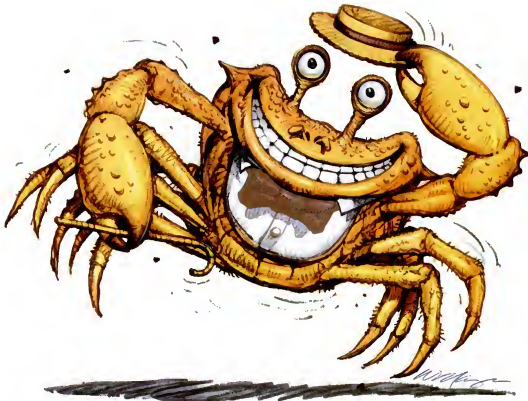
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CIRCLE 305 ON READER SERVICE CARD

Two new laptop computers enter the crowded field. While the Datavue 25 offers PC-compatible portability, the Visual Commuter is in search of its identity.

Good IS NOT Good Enough



Getting noticed in the computer world is no easy task. If they're not IBM or Apple, manufacturers may find attracting the public's interest can be difficult. Even machines that are technologically innovative (such as the HP Touchscreen) or solidly engineered (such as the TI Professional) have received only fleeting attention.

This problem is acute for the two recently released PC-compatible portables, the Visual Commuter from Visual Technology and the Datavue 25 from Datavue Corporation. As recently as last year, machines with the price/performance ratios and features of these two units would have been extremely attractive and noteworthy.

But today they are just two more machines searching for a place in the market. Both computers feature virtually total PC compatibility, both can handle large quantities of memory (up to 512K RAM on the Commuter, 640K on the Datavue), and contrary to the current trend in portables

toward 3½-inch disk drives, both come with full 5¼-inch drives. Unfortunately, even with all these capabilities, they are at best somewhat interesting. At worst, they are undistinguished. And history has shown that undistinguished computers usually don't fare too well.

Split Personality

The Commuter is a hybrid machine, neither a portable nor a desktop, though it combines some features of each. The basic unit comes with a single disk drive and weighs only 16 pounds in an extremely low-profile case (18 by 15 by 3 inches). Though it also comes without a display (you can obviously plug in a full-size monitor), most people will want the optional LCD display that is built into the cover of the machine. You can buy both 16- and 25-line versions. (For a review of an older version of the Commuter, see "Computing on the Run," *PC*, Volume 4 Number 6.)

The Commuter comes with 256K

TWO PORTABLES

RAM, expandable to twice that amount. Standard features include one parallel and one serial port and cards to drive either a monochrome or color/graphics display. The 5¼-inch disk drives (no hard disk version is available) conform to the IBM format and functioned without a problem. MS-DOS (slightly customized for the Commuter) and GWBASIC are included.

The well-written documentation includes a user's guide/DOS manual and a GWBASIC manual. The unit passed all of the acid tests for PC compatibility. *WordStar*, *1-2-3*, *Flight Simulator*, PC DOS, and everything else that runs on the PC also functioned without a hitch on the Commuter.

Unlike some portables that run a little on the slow side, the Commuter functions much more like a desktop clone, which in fact it more closely resembles. The excellent keyboard has a very good feel, and LCDs indicate the position of the Caps-Lock and NumLock keys.

The Commuter does not hit you with any surprises; it merely does everything it should. However, its ambiguous character—somewhere between a desktop and a portable—creates a number of problems.

The Unvisual Display

Virtually all LCD displays share some problems to varying degrees. The main problem, of course, is that you can't read them very well, especially when you can't set up a light to reflect directly on the screen. Unfortunately for the Visual Commuter, it was poorly named when it comes to screen display.

The main problem is the angle of the flip-up top that holds the LCD screen. It has only one position, an extreme backward tilt that makes it impossible to see, much less read, unless you have perfect lighting and a chair that's the perfect height. While this might have been at least partially forgivable in a machine designed to stay in one place, in a portable/transportable, it is a cardinal sin. Moreover, it seems that the problem could have been easily corrected by enabling the top to ratchet to different positions.

I found that I could hold the screen in positions that were much more comfortable to read, but the weight of the top kept it from staying there on its own. Granted,



you can use a full-size monitor, which sits nicely on the flat enclosure but which defeats the purpose of a portable in the first place. The top also tends to catch your fingers as you try to close it while keeping the connecting cable inside the machine. Score -2 for the display.

The second major problem with the Commuter is power. It runs only on AC power, since no battery pack is available. That makes it impossible to use the machine in many situations where you would want a portable and substantially reduces its attractiveness and viability as a portable machine. Despite its great keyboard and apparently complete compatibility, the drawbacks of the Commuter so severely limit its usefulness as a portable that I couldn't recommend the machine.

Another problem with the Commuter is the price. The Commuter IV-2-3 (with 256K RAM, a 25- by 80-column LCD, and two disk drives) lists for \$2,495, and the 512K version (supplied for this review) sells for \$2,935. For that kind of money you could buy either a true desktop machine (including one from IBM) or a true portable. More than likely, you would be happier with one of the latter than with the Visual Commuter.

In fact, why anyone would want to buy the Commuter is a mystery to me. Unless you find yourself in the unusual position of only needing to use it in two places and have a full-size monitor in each one, the Commuter is probably not the right machine for you.

A True Portable

Like the Commuter, the Datavue has its good and bad points—but it has fewer bad points than the Commuter. To its credit, the Datavue is sure of what it is: a true portable, weighing in at an easy-to-carry 12 pounds.

The 13½- by 10½- by 6½-inch cabinet is off-white plastic and stands upright. The basic unit contains 128K RAM and 16K of diagnostic and bootstrap ROM. The RAM is expandable to 640K, the amount in the machine I reviewed. One floppy is standard, but the addition of a second floppy requires a bit of doing. The second drive comes with a plate that connects to the back of the unit, and the extra drive connects to that, almost doubling the width

The Commuter's ambiguous character—somewhere between a desktop and a portable—creates a number of problems.

and bulk of the computer.

The \$1,995 base price of the Datavue includes a 25-by 80-column LCD display, a parallel and serial port, and MS-DOS. A battery pack and internal modem are optional peripherals.

The battery-powered infrared keyboard of the Datavue flips down from the top of the unit. It adjusts to a second height position, which I found more comfortable. The infrared keyboard works rather well and is certainly easier to adjust than the fixed keyboard on the Commuter. However, the infrared feature means another set of batteries to carry around and replace on road trips. The optional keyboard cable is probably worth buying. Another disadvantage is that the Datavue keyboard has a spongy, lightweight feel and is not comfortable for long periods of typing or high-speed touch typing.

The flat-panel LCD display is hinged at the top to pivot into several positions, another advantage over the Commuter. The readability of the display is about average



Visual Commuter
Visual Technology, Inc.
540 Main St.
Tewksbury, MA 01876
(617) 851-5000

List Price: With 256K RAM, 25- by 80-column LCD, and 2 disk drives, \$2,495; with 512K RAM, \$2,935.

CIRCLE 700 ON READER SERVICE CARD

Datavue 25

Datavue Corporation
4357 Park Drive
Norcross, GA 30093
(404) 923-1271

List Price: With 128K RAM, 25- by 80-column LCD, and one disk drive, \$2,195; with 640K RAM, \$2,795.

CIRCLE 669 ON READER SERVICE CARD

for LCD portables—I've seen both better LCD displays and worse ones.

You can theoretically adjust the character intensity by pressing the Ctrl key, the left Shift key, and the S key at the same time. In practice, this move produced little visible effect. Pressing Ctrl, left Shift, and various other keys lets you control character contrast, audio feedback (key click), and battery level. You can also call up a system status summary screen that displays DIP switch settings, indicates the disk drive in use, and instructs you in the use of these customizing features. When powering up the Datavue, you can assign some of the RAM capacity to be used as a RAMdisk (up to 384K on a 640K machine)—a nice feature. You can also set a default RAMdisk size so that you can bypass this step.

Uneven Documentation

The documentation is of uneven quality. For example, when I began testing the Datavue, I was unable to get a disk to boot. It turns out that I was inserting the disk the wrong way; you must turn your disks so that the labels face away from you, contrary to what you would expect. To compound the problem, a large picture on page 3 of the user's guide shows a disk label facing forward. Buried among the text on page 9, a brief passage tells you how to insert the disks correctly.

At times, the user's guide is inaccurate. For example, it touts the machine as the "world's first truly personal computer"—one you can use "on a plane, train, boat, taxi, bus, . . . etc." In reality, balancing the computer on your lap and being able to position the infrared keyboard at the same time is next to impossible. Also, the manual's description of what a computer is and does is both unnecessary and condescending. How many people would buy a computer and not know what it can do? However, in other areas, the documentation is clear and lucid.

Very Compatible

Like the Commuter, the Datavue boasts virtual 100 percent PC compatibility. It runs everything that the Commuter does with no problems. Its built-in disk drive is somewhat slower than the drives in the Commuter, but not annoyingly so. Al-

TWO PORTABLES

though BASIC isn't included, it runs disk-based BASICA (Compaq version) without a hitch, including the IBM PC demonstration programs.

In all fairness, most of the problems with the Datavue are relatively minor, and some, like the annoying, inadequate documentation, don't affect the performance of the machine. However, they do add up.

The Datavue did perform well and reliably and is quite easy to transport. I assume that the RAMdisk is supposed to offset the lack of a second standard drive. But adding all that extra RAM raises the price quite a bit. And for a machine like the Datavue—a reasonably nice but not exciting portable clone—price is definitely a consideration.

To Buy or Not to Buy

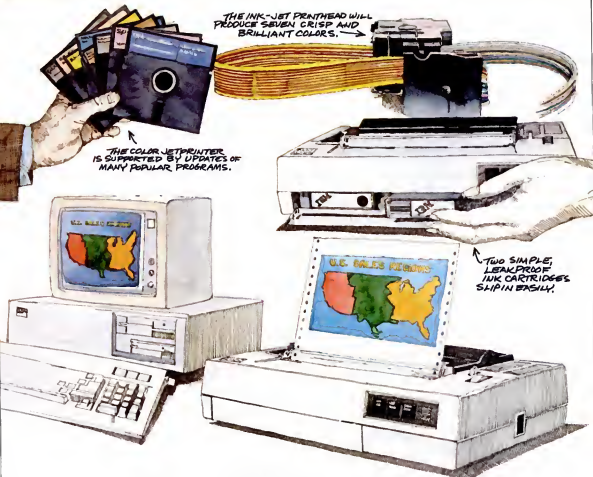
If you're in the market for a PC-compatible portable/transportable, would you want to buy either the Visual Commuter or the Datavue 25? The answer is maybe but probably not. The Commuter has some major drawbacks. Although it works well, a number of other nice desktop or portable machines perform equally well for the same price. It offers nothing new in terms of technology or design. It's not a portable, it's not a desktop computer, and it's more than likely not the best purchase you can make.

The Datavue 25 is a little different. First, it is a true portable, so certain shortcomings (such as the LCD display) are forgivable since they are shared by most ma-

chines in this category. It does feature complete PC compatibility, easy portability, a full-size screen, and battery operation. However, the cheap, flimsy feel of the keyboard is not only uncomfortable, but doesn't do much to inspire confidence in the sturdiness of the computer in general. Despite these caveats, you might want to consider purchasing the Datavue. If you can find one that is priced lower than other comparable portables, it might be a good buy. Otherwise, there is probably something else out there that will make you much happier. ■

Jon Pepper is technical writer for such major companies as Wang Laboratories and Digital Equipment Corporation.





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3-D RECONSTRUCTION: SEEING BEYOND

Imagine that someone dropped several objects into a loaf of bread just before baking it, then sliced the baked loaf into 100 slices, gave you a picture of the face of each slice, and asked you to determine what objects were embedded in the loaf. This task is analogous to that facing researchers who must describe the hundreds of individual components within a cell that has been cut into a continuous series of slices called serial sections. Physicians, too, must learn to visualize the structure of a patient's internal organs from serial cross sections that have been imaged by computerized axial tomography, or CAT scanning.

However, trying to mentally reconstruct a whole cell or organ from a visual study of each cross section in the series can be very difficult—especially if there are many substructures and a great many sections. One alternative procedure is to trace the profile of each substructure onto a thin slab of wax, cut it out, then stack all the profiles together and glue them into a physical model, creating an actual three-dimensional reconstruction of the sectioned object. Unfortunately physical modeling, a standard medical technique since the late 1800s, is difficult and time consuming.

Now a new alternative, computer-aided three-dimensional reconstruction, offers another way to display data obtained from CAT scans. Computerized three-dimensional (3-D) reconstruction can create

models in a few hours that once would have taken weeks or months to build physically. The laboratory in which I work uses PC3D, a system consisting of several programs for three-dimensional reconstruc-

three-dimensional model that can be rotated on the computer screen and viewed from any orientation.

PC3D can reconstruct any object from serial sections. First, a program called 3D-

TRACE enters each serial section into the PC by tracing it onto the digitizing tablet. As it enters this information, it simultaneously displays on the PC screen the profile of each structure that the section contains. Each serial section is stored as a separate file so that it can be easily recalled, displayed, and edited at a later time; different parts of a structure can also be labeled for independent recall and display.

After the serial sections have been entered into the PC, another program, 3D-DISPLAY, creates the three-dimensional reconstruction. You can rotate this reconstruction through any orientation by specifying rotations around the x, y, and z axes and display any individual part or combination of parts. Although CAT scans, like X-ray images, are black and white, each part of a structure can be assigned a unique color. The object can also be displayed as if it were solid or transparent. To display an object as solid, 3D-DISPLAY simply eliminates the hidden lines.

Image resolution ranges from 320 × 200 pixels in one color to 640 × 400 pixels in 16 colors.

3D-DISPLAY also automatically generates multiple views of an object and stores them on disk. Then, by reading the stored

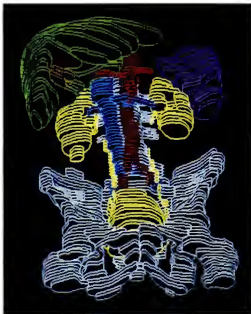


Figure 1A: A normal abdomen seen from below. The bones are shown in white; kidneys, ureters, and bladder in yellow; arteries in red; veins in blue; liver in green; gall bladder in brown; and spleen in purple.

tion that I designed for the IBM PC, and some graphics hardware. Instead of tracing the profiles of sectioned objects onto wax, you trace them onto a digitizing tablet. PC3D then stores them in the PC and stacks these profiles mathematically into a

Computer-aided reconstruction is a valuable tool in both biological research and diagnostic medicine. Its availability on the PC may also lead to applications in fields such as art, geology, and mathematics.

THE SURFACE

image directly from the disk into the RAM area used by the color monitor, *3D-DISPLAY* calls up a multicolor, high-resolution image in a fraction of a second.

Another program, *3D-MOVE*, rapidly displays the series of images in sequence to create a rotating view of the object. In addition, it lets you flip through the series of images interactively by using the cursor keys or a mouse. With *3D-MOVE*, you can rotate the reconstruction back and forth on the screen so easily that it's like rotating an object in your hand. *3D-MOVE* gives you an excellent appreciation of the complexity of three-dimensional objects.

Creating PC3D

Originally, my colleagues and I in the radiology and pulmonary departments at Duke University Medical Center performed computer-based reconstruction on a supermini. For 4 years, we used software that I developed on a VAX 11/780. However, most people do not have access to a computer as expensive as a VAX or have limited access. Even in our lab, so many people wanted to use the VAX that its digitizing tablet and computer graphics terminal were occupied full time, while a backlog of data continued to accumulate.

We therefore investigated the possibility of purchasing an additional digitizing tablet and graphics terminal so that two people could simultaneously enter data into the VAX. However, since the annual

cost for such additional use of the VAX would be greater than the cost of an IBM PC equipped for color graphics, we decided to use PCs and input our serial sections off-line from the VAX.

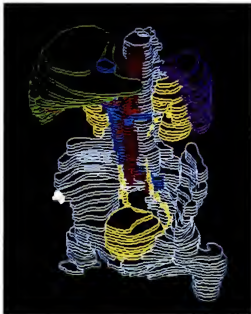


Figure 1B: A view of the normal abdomen from the left and above. This and Figure 1A show the relationships of various internal organs to each other. These two views were reconstructed from 35 CAT scans.

This turned out to be an excellent solution. Since users could input data off-line on PCs equipped with digitizing tablets and since no direct connection to the VAX was required, PC workstations could be situated in convenient locations away from

the VAX. Once a complete set of serial sections was input into a PC, it was transferred to the VAX over conventional telephone lines by modem. Entering data on the PC diminished the amount of VAX

time that was required for the reconstruction process.

At that point, though we could input our serial sections on the PC, we still needed the VAX for three-dimensional reconstruction and display. Unfortunately, the software that I had developed on the VAX could not run on a PC, primarily because of the microcomputer's memory limitations. However, redesigning the software for the PC has made it possible to perform the entire reconstruction process—from data input to three-dimensional display—on the PC.

PC3D uses compiled languages for maximum speed; most of its software is written in C. Since many researchers and physicians using the system are not familiar with computers, the system is completely menu driven rather than command driven. A manual supplied with the package describes the theory of three-dimensional reconstruction, gives an outline of each program, and explains how each program is used. You can then use the sample data supplied in the on-disk tutorial to gain immediate experience with the package.

Choosing the Hardware

PC3D operates on an IBM PC with 512K of RAM. We chose a GTCO digitiz-

3-D RECONSTRUCTION

ing tablet for data input because of its large size (20 by 20 inches), versatile cursor (16 keys), and high resolution (0.001 inch). Since the GTCO Digi-Pad 5 digitizers all use the same controller, the software should operate on any tablet size from 6 by 6 to 42 by 60 inches. Depending on the application, you can use opaque, backlit, or rear-projection models.

The system also uses a Tecmar Graphics Master color/graphics board. Though PC3D can run on a PC equipped only with floppy disk storage, a hard disk—speeds reconstruction and image storage. While not absolutely necessary, an 8087 math coprocessor helps speed up the large number of calculations required to rotate a three-dimensional reconstruction.

To obtain permanent pictures, you can photograph high-resolution images in color or directly from the screen (a Princeton HX-12 monitor was used for the photographs in this article) or print the 3-D images on a Diablo C-150 ink jet color printer. PC3D can be altered to accommodate other color/graphics boards, digitizing tablets, and color printers.

Imaging Internal Structures

Introduced in the early 1970s, computerized axial tomography (CAT or CT for

computed tomography) is a noninvasive imaging technique used extensively in medicine to view the internal structures of the body. After collecting multiple X-ray views, a CAT scanner reconstructs them into cross-sectional gray-scale images of the particular body part. (Gray scale refers to the density; as in an X ray, the brighter the white, the greater the density.) CAT scanners are capable of collecting serial slices from 1.5 to 10 mm thick with a resolution of less than 1 mm. In many cases, they provide information that previously could have been learned only through exploratory surgery.

PC3D accepts serial sections from any source, including electron or optical microscopy, macroscopic sectioning, CAT scanning, positron emission computed tomography, magnetic resonance imaging, and autoradiography. The examples that follow show how PC3D can reconstruct an object as large as a person or as small as a single cell.

PC3D allows you to display any combination of organs within the body and view them from any orientation. Displaying an organ individually gives you an appreciation of its shape, while plotting several organs simultaneously helps you understand their relationships to one another.

The two views of a normal abdomen given in Figures 1A and 1B illustrate how three-dimensional computerized reconstruction can be used in my specialty—diagnostic radiology—to show the relationships of various internal organs. Color added during reconstruction identifies the individual parts. These two views were reconstructed from a set of 35 CAT scans; each section was 10 mm thick.

Hip Fractures

Hip fractures, which can be exceedingly complex because of the multiple overlapping bones in that region, frequently contain small bone fragments within the joint that standard radiographs do not show clearly. But even after a set of 20 or 30 CAT scans are made, visualizing the three-dimensional relationships among the multiple bone fragments within a comminuted hip fracture—where damage is extensive—is extremely difficult.

In such cases, computerized reconstruction of the abnormal hip has obvious advantages. First, overlapping bones and other structures can be subtracted mathematically, allowing an orthopedic surgeon to study hidden portions of the hip. Second, with a patient unable to move the injured hip, it may be impossible to obtain

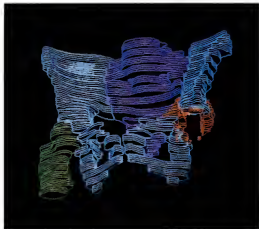


Figure 2: To show the damaged wall of a fractured hip socket, the femur is mathematically removed and the pelvis rotated to the right. Pelvic bones (left and right iliac), blue; midline sacrum, purple; thigh bone (femur), green; fracture fragments, orange.

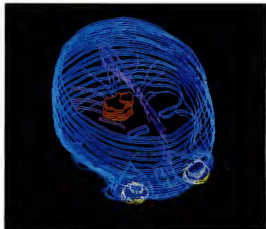


Figure 3: Reconstruction of a human brain. The skull, a transparent blue surface, has the top removed to show a tumor (red). The falx cerebri, a midline septum between the left and right cerebral hemispheres, and the tentorium are purple; the eyes are yellow.

multiple X-ray views by moving the patient. Instead, using PC3D, you can obtain any view of the hip by mathematically rotating a three-dimensional reconstruction derived from a single set of CAT scans. Third, the three-dimensional anatomy presented by the displays is intuitively familiar to surgeons and helps them to clearly visualize the information that the two-dimensional CAT scans provide.

Figure 2 shows a fracture in which the posterior wall of the left hip socket has been broken off and displaced toward the side and back. Normally, the femoral head would conceal the damage. Only when the femur is mathematically removed and the pelvis rotated to the right can the damage be clearly seen. This reconstruction was made from 28 CAT scans measuring 5 mm thick through the hip and 10 mm thick through the rest of the pelvis.

Probing the Brain

CAT scans also allow the detection and precise localization of abnormalities in the brain. Dr. Robert Albright, a neurologist at Duke, uses PC3D to reconstruct brain tumors and their surrounding structures from images produced by CAT scans. In addition, it may be possible to use the program to track tumor volume. Dr. Albright

feels that 3-D reconstruction will prove important in evaluating different treatments for brain tumors.

In Figure 3, a reconstruction of a brain has been rotated to show the front and right side of the head from above. The skull is displayed as a transparent blue surface, with the top removed for a better view of the tumor, which appears in red. The serial sections are 5 and 10 mm thick.

The Developing Heart

Dr. Eric Effmann, a professor in the department of radiology and anatomy at Duke, and Bradley Smith, a graduate student in anatomy, are using 3-D reconstruction to study normal and abnormal embryologic development of the heart. By studying a strain of mice prone to developing congenital heart malformations like those in human patients, they hope to increase their understanding of what causes congenital cardiac malformation.

The two researchers feel that computer-aided reconstruction has several advantages for their work. Mainly, it allows them to study the complicated relationships of the heart's major blood vessels, which are too numerous to visualize from serial sections. With computerized reconstruction, they can dissect the heart "math-

ematically" by including or ignoring structures that appear in the sections. Actual dissection of an embryonic mouse heart would be difficult in a subject that small and would necessitate destroying the internal structure. Computerized reconstruction lets them track selected structures in the heart and its major vessels; without it, precise determination would be difficult because of the large number of surrounding structures.

Figure 4 shows the chest of a mouse embryo only 8 mm long. To create this reconstruction, a 0.6-mm long region of the embryo was sliced into 60 serial sections, each 0.010 mm thick. Prior to input into PC3D, Drs. Effmann and Smith enlarged these sections 100 times with an optical microscope.

Slicing a Single Cell

Dr. Stephen Young, a pulmonary physician at Duke, has been using computer-aided reconstruction for several years to study lung cells. His reconstructions have shown that internal cellular organelles are not randomly distributed throughout the cell. Instead, they are distributed in a way that correlates with their function (Figure 5). The discovery of their three-dimensional organization would not have been

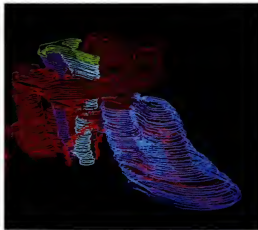


Figure 4: Chest reconstruction of a 12-day-old, 8-mm long mouse embryo. The outside of the heart is a transparent blue surface, with the cardiac chamber and major blood vessels in red. Also displayed are the esophagus (purple), trachea (blue), and pharynx (green).

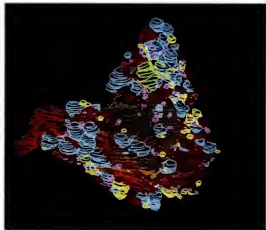


Figure 5: This reconstruction of a lung cell shows that organelles are distributed according to their function. Nucleus, orange; mitochondria, red; lamellar bodies, blue; Golgi apparatus, green; composite bodies, yellow; multivesicular bodies, purple.

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Conclusion

The availability of software/hardware systems like PC3D overcomes both the limitations of physical model building and the need for the expensive hardware that most other 3-D reconstruction systems require. While implementing such a system with more sophisticated hardware may speed image display and increase the use of color—perhaps even allowing shaded surfaces—such refinements will probably not yield much more information. In most cases, PC3D runs on an IBM PC that costs about \$8,000 for a total system—including digitizer and graphics equipment—at roughly the same speed as similar software did on the VAX 11/780, which costs several hundred thousand dollars.

The ability to perform 3-D reconstruction on a machine as widely available and inexpensive as an IBM PC offers exciting possibilities in both basic biological research and clinical medicine. Perhaps workers in other fields such as mathematics, engineering, geology, art, and architecture will find it equally useful. ■

Dr. Evan K. Fram is a resident in radiology at the Duke University Medical Center in Durham, North Carolina.

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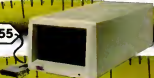
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A Footnote To WORD PROCESSING

Sacrificing footnote management and index generation for on-screen editing is no longer necessary. Some word processors can accommodate such complex features with a what-you-see-is-what-you-get approach.

Not long ago if you prepared complex reports with numerous footnotes, indexes, and even tables, you faced a tough choice when shopping for a word processing program. If you wanted a modern, "What You See Is What You Get" (WYSIWYG, pronounced "wizzy-wig") program like *WordStar*, you had to forgo footnote management and other advanced formatting features.

If what you needed was advanced formatting, your only option until recently was to use a two-stage, editor/formatter word processing program. The price was a screen cluttered with formatting commands. Also, indentations and spacing were left up to your imagination until you saw the final printout. All in all, you had to suffer with less-than-perfect results or a lot of extra effort on your part.

Today the situation is no longer so bleak: The three programs reviewed here, *WordPerfect 4.0*, *XyWrite II-Plus*, and *WordStar 2000 Plus* (for product information see *Word Processing: The Latest Word* in this issue), give you the convenience of WYSIWYG editing without sacrificing advanced formatting. They keep track of footnote numbers and generate tables and indexes as well. Two of the programs will also automatically renumber your headings, if you add or delete one.

The secret is that these programs embed formatting commands into your text. You can't see the commands, though, unless you enter "expanded display mode."

In expanded display mode all secrets are revealed. You can see the commands that control line spacing and margins, for instance, as well as the full text of your footnote and index entries. It looks like you're working with a two-stage program. But, press a key or two, and you're back in normal display mode, which shows your text WYSIWYG style.

These programs won't display your footnotes or indexes on screen until you give the command that simulates the second stage of the editor/formatter programs. They do show, however, the immediate effects of simple formatting commands like margin changes.

Another reason for choosing one of these programs is that they all can edit at least two documents at the same time (*WordStar 2000* allows you to edit three). This feature is especially handy for involved footnote work: you can keep your main text in one area and your bibliography in another. Then whenever you need a citation, you "cut and paste" from the bibliography to the main text.

The following reviews of each word processing program include a general eval-

FOOTNOTES AND INDEXES

uation and an explanation of how their advanced formatting features work.

Highest Scores for WordPerfect 4.0

In the field of advanced formatting competition *WordPerfect 4.0* deserves a gold medal. *XyWrite II-Plus* offers stiff competition in footnote handling, and *WordStar 2000* has a trick or two that *WordPerfect 4.0* lacks, but *WordPerfect 4.0* alone garners all the high marks for advanced formatting tests.

WordPerfect 4.0 is a joy to use. Its editor is fairly fast, even if you run it on a floppy-disk-based system. Sometimes you have to wait for the program to scroll or bring in a new menu from disk, but never for more than a second or two. All the command menus are accessible through use of the function keys, which are labeled in a well-designed keyboard overlay. And I found nary a bug.

As befits a menu-driven program, *WordPerfect 4.0* doesn't give you much opportunity to mess up. A function key summons the footnote menu, a single line at the very bottom of your screen. The menu's "create" option calls up a blank screen, where you can enter the text of your note. A nice feature, not duplicated by the other two programs, is that your call symbol appears in the upper-left-hand corner of the footnote screen to remind you to add punctuation or indentations. When you're finished, another key returns you to the main text, where the call symbol marks the footnote's location.

For most footnote work, that's all you'll need. If you add or delete a footnote, *WordPerfect 4.0* takes care of renumbering. When you print the document, each note will appear on the appropriate page with its call symbol in superscript and with a 2-inch line separating the notes from the text. For multipaged footnotes *WordPerfect 4.0* will fill up subsequent pages and then return to the main text.

Fancy Footnotes

If you want to get fancy, *WordPerfect 4.0* will cooperate. The footnote menu offers several options. The "edit footnote" option calls up the footnote editing screen, and lets you make changes. You can create "endnotes" that appear at the end of the document instead of at the foot of the page.

And the "footnote options" menu lets you make such style choices as what kind of call symbol (number, character, or letter you want) or whether footnote numbering should begin anew on each page.

WordPerfect 4.0 offers a similar array of options and ease of use when you want to create indexes and tables of contents. (The two processes are quite similar.) Take index creation, for example. Sup-

A nice feature in *WordPerfect 4.0* is that your call symbol appears in the upper-left-hand corner of the footnote screen to remind you to add punctuation or indentations.

pose you're writing a paper on silver-mining prospects in Bolivia and you want to create an index entry for your discussion of Bolivia's recent history, with a subheading referring to the country's 1952 revolution. You would direct the cursor to the place in the text where the revolution is first discussed and then call up the proper menu, which prompts you for the index heading. *WordPerfect 4.0* answers the prompt with the word next to your cursor. If you'd like a different entry, you either type in your own words, or move in a phrase from your text. In this case you'd type in "History" and hit Enter. Then *WordPerfect 4.0* prompts you for the subheading.

You follow a similar procedure for all your index headings. Before you print your document, you mark where in the text the index should appear and choose one of five style options for your index. For instance, the page numbers can either directly follow the entries or be separated by "leaders," dots that connect a flush-left index entry with a flush-right page reference. When you print your text, the index will appear at the spot you requested.

Creating a table of contents is essentially the same as creating indexes, except that headings that appear in your document must serve as your table of contents entries. This limitation is unlikely to repre-

sent a problem since tables of contents usually refer to chapter or topic headings that appear in the document.

The table of contents can use *WordPerfect 4.0*'s automatic heading numbers, which follow one of three predefined styles, or a style you create. Assume that you choose the outline style: Roman numeral followed by a capital letter. *WordPerfect 4.0* knows what kind of number you want by your cursor position. If the cursor is flush left when you request a heading number, a Roman numeral appears. If the cursor is indented one tab stop, the program inserts a capital letter. With two tab stops you get an Arabic numeral. *WordPerfect 4.0* can produce these automatic numbers up to seven consecutive tab stops. And if you delete an automatic number or insert one, the program will renumber all the other headings.

All in all, *WordPerfect 4.0* boasts an impressive set of advanced formatting features. If you use many footnotes and numbered headings in your writing and compile a lot of indexes and tables of contents, *WordPerfect 4.0* may be perfect for you.

Speedy Delivery with XyWrite II-Plus

XyWrite II-Plus is a top-notch word processing program. As a general-purpose writing tool, it compares favorably with *WordPerfect 4.0*. In some ways it's superior: I've never seen a faster editor. Its scrolling is instantaneous, and it continually reformats your text as you write; so you never have to fix a ragged paragraph with a reformat key.

XyWrite II-Plus also rivals *WordPerfect 4.0* in footnote power. It falls back into second place, however, because it lacks automatic heading numbers, its index and table of contents functions are not as powerful, and its features are somewhat harder to master.

Unlike most word processors designed for the PC, *XyWrite II-Plus* is command driven rather than menu driven. Instead of choosing options from a menu, you tell the program what you want by typing a mnemonic command code. If you want *XyWrite II-Plus* to search for the word *Bolivia* in your text, for example, you press the function key that makes your cursor jump to the program's command line and enter the command `se/Bolivia/`.

This isn't as awkward as it may sound, since you can invoke the most-common editing commands, such as delete and cut-and-paste, using the function keys.

When you tell *XyWrite II-Plus* to create a footnote, the part of your screen from the cursor downward goes blank, and a prompt reminds you to press F3 when you're done entering the text of your footnote. Since the call symbol doesn't appear in the creation window, you have to imagine its presence when adding punctuation and spacing. And your call symbol must be a number.

You can use all *XyWrite II-Plus*'s editing and formatting commands when writing your footnotes. And the program has some special footnote-formatting commands. These commands take care of such chores as defining how the footnotes will be separated from the text (you can type in any kind of symbols and spacing you want) or whether footnotes should always appear at the very bottom of the page, even if the text is short. You can also reset the footnote number sequence so that it starts anew on each page. And you can change footnotes to endnotes with a simple command sequence.

If you want to edit a footnote that you have already created, you must switch to the program's expanded display mode. This shows you the footnote sandwiched into the regular text. Using the program's regular editing commands, you can change the note and then return to regular display mode by pressing the appropriate function key. In most cases this method works without a hitch, but if you're editing a very long footnote, *XyWrite II-Plus* may balk at returning to regular display mode. To remedy this, simply scroll to the beginning of your document.

XyWrite II-Plus can also turn a bit sulky when it's time to print multipaged footnotes. On my first try, it refused to print more than one page of a long footnote. When I called *XyQuest*'s customer support, I learned that there is an undocumented parameter to the program's "page length" command that enables *XyWrite II-Plus* to print long footnotes properly. So handling long footnotes requires a bit of tinkering.

Creating entries for an index or a table of contents is almost identical to creating

footnotes. So it's a very simple procedure. Unfortunately, the program also leaves out any provisions for subheadings, and when it compiles an index, the program won't resolve multiple references. If you refer to Bolivia's revolution on three separate pages, *XyWrite II-Plus* will produce three index entries for "revolution," leaving you to combine them yourself.

To print your document, you must first

You can use all of
XyWrite II-Plus's editing
and formatting commands
when writing your
footnote. And the
program has some special
footnote-formatting
commands.

add formatting commands to the end of your text, to define the placement of indexes and tables. Although it seems counter to common sense, even the table of contents marker must go at the end of the text. You can, however, use another command to give the table of contents the right page number. *XyWrite II-Plus* will compile your indexes and tables when you print your document, or if you wish, the program will put the indexes and tables in separate text files.

Despite its drawbacks, *XyWrite II-Plus* is a powerful word processing program. Once you learn its peculiarities, you can make it perform almost any footnote trick that *WordPerfect 4.0* can, and it has an ultrafast editor. If you don't need subheadings in your indexes and tables and you won't miss automatic heading numbers, *XyWrite II-Plus* could be the right program for you.

And, in Third Place, WordStar 2000 Plus

WordStar 2000 is the Sherman tank of word processors. The word processor of choice for those who simply want a powerful program, it extorts a price for this power: It's painfully slow on floppy-disk-based systems. Even with a hard disk, it's no speed demon.

Given its overall power, the program's weakness in footnote control is hard to understand. To be accurate, it doesn't offer footnotes. It produces endnotes, which are printed at the end of your document.

Also, no footnote creation window helps you visualize how the note will appear when printed. Instead, *WordStar 2000*'s footnote creation command kicks the program into expanded display mode, where you see your text amidst all the embedded format commands or, as *WordStar 2000* calls them, "tags." Your cursor appears between two footnote tags. Here you create and edit your note, using any of *WordStar 2000*'s regular editing commands. When you're done, move the cursor beyond the second footnote tag and tell the program to return to normal display mode. To edit or delete the note, you must return to expanded display mode.

WordStar 2000 gave me some rough sailing when I tried to create a multipaged endnote. When attempting to move the endnote from my bibliography which was in one window, into my main text, which was in another window, the program suddenly stopped in its tracks. The screen informed me that my disk, which had been one-third empty when I started, now had no room. Having two open files obviously consumes a great deal of space—another argument for using a hard disk if you want to use this program.

Adding On Power and Features

WordStar 2000 by itself won't produce indexes and tables. To get those features, you must buy the higher-priced *WordStar 2000 Plus*, which includes an updated version of MicroPro's *StarIndex* program. *StarIndex* gives you the power you expect from a high-priced program, although its features are clumsier and less flexible than those of *WordPerfect* and *XyWrite*.

StarIndex's clumsiness stems from its being an imperfectly integrated add-on product. While you use *WordStar 2000*'s editor to mark the index and table entries and automatic heading numbers in your text, you have to run *StarIndex* from the *WordStar 2000*'s main menu to create your index and tables and to make the automatic heading numbers appear. *StarIndex* leaves your original text unchanged and creates a new file for your index, a



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FOOTNOTES AND INDEXES

new file for your tables, and a final new file containing a copy of your original text, in which the automatic heading numbers appear.

To continue editing your document, possibly changing page numbers or adding index entries, you must remember to work on your original file. The *StarIndex* output file no longer contains your index and table markers. And you must remember to run

**StarIndex is able to
mark cross-references.
This allows you to refer
to another part of your
text without fear that
editing the document
will change the page
number.**

StarIndex again before you print your final result.

Creating an index or entry with *WordStar 2000* is simple and straightforward. You give the appropriate command, which brings up the index entry menu. The menu prompts you to type in the heading and subheading (if any) and indicate if you want the page number in boldface (your only formatting option). Otherwise your index follows a single, preset format: two columns of text per page, with the page number directly following the subject heading. If you want a different format, subjects on the left side of the page and page numbers on the right, for example, you must edit the index output file and create the format yourself.

Once you define the entry, you can't change it, even though you can see it when you switch to the program's expanded display mode. To change an index entry, you must entirely delete it and start over.

Creating a table of contents with *WordStar 2000 Plus* is very similar to creating footnotes. You move the cursor to where you want the heading to appear and then type the table of contents marker command. This command includes a number indicating the level of the heading, ranging from 1 to 4. (Level 1 would indicate a chapter heading, level 2 a topic within the

chapter, and so on.) The program now pops into expanded display mode, and the cursor reappears between two tags that display the level number. Here you type in your heading. Unfortunately, the heading disappears from view when you get out of expanded display mode. It reappears again, together with the automatic heading number, only in the output file created when you run *StarIndex*. Using a similar technique, you can mark headings in tables that will list your document's figures, tables, and appendices.

You control output style for the table of contents and for your automatic heading numbers by choosing one of five predefined styles. In all styles subheads are indented, but they differ in the numbering system used. Unlike *WordPerfect 4.0*, *StarIndex* does not allow you to define your own numbering style.

One nice feature in *StarIndex* not available in the other programs is its ability to mark cross-references. This allows you to refer to another part of your text without fear that editing the document will change the page number.

Even with its limitations, *WordStar 2000's StarIndex* is a powerful indexing tool, allowing subheadings and resolving multiple references. It falls behind *WordPerfect 4.0* in automatic numbering capabilities because its numbers only appear in a secondary file. And since *WordStar 2000* cannot create true footnotes, I would rate it a distant third place, behind *WordPerfect 4.0* and *XyWrite II-Plus*.

So there you have it—the successful union of WYSIWYG editing and advanced formatting. Writers who love WYSIWYG editing but need the power and additional features of a two-stage word processor can now have their cake and eat it too. They can sculpt their text on the screen and get help with those messy and tedious footnotes and indexing chores.

Switching to a new word processing program involves a major investment in time as well as money. But the first time you finish a research paper in record time without retyping and renumbering your footnotes, you'll probably conclude that your time and money were well spent. ■

Dara Pearlman is a frequent contributor to PC Magazine.

Database search-assistance software helps you make efficient use of your valuable time on-line.

Gateway Software To the Information Stars



On-line information can be a tremendous problem solver if you do a lot of research, work in specialized areas, require the timeliness that many databases can offer, or need the precise searching capabilities provided by the on-line service's software.

However, using on-line database sources is complicated and can run into a lot of money. Packages referred to as gateway, front-end, or search-assistance software can make it easier for you to find on-line information.

Gateway software products are sophisticated communications programs with built-in searching capabilities. Like many other communications packages, they enable you to exchange data with remote mainframes. What distinguishes them from the other methods of performing on-line searches, however, are elaborate interfaces that are designed to allow untrained

users to retrieve data from highly advanced on-line databases. For example, if you were to search a database directly, you would have to know the command for starting the search and the logic for linking terms, understand the format of the database records, and be able to put these pieces together in different ways. With gateway packages, however, all you need to do is enter one term or phrase, and the software does the rest.

As communications software, these packages not only carry out the basic function of data transmission, but they also take advantage of the PC's computing capabilities to make interacting with the host computer easier and cheaper.

While gateway software programs do make it easier to conduct a search, they cannot make it effortless. You don't have to learn commands per se, but you do have to "learn" on-line searching. You still

have to think through the search, analyze its elements, imagine the right search terms, combine them in the right way, and so on. The software is very good at helping you do this, but the thinking itself is still your job.

Gateway software is not able to overcome some of the basic obstacles to using on-line databases either. For instance, many databases are bibliographic; they give you only the reference to an article, report, or study. To get the full story you may still have to make a trip to your local library or pay around \$10 per item at a document supply service. Also, the software cannot alert you if you pick the wrong database, if your search strategy left out something important, or if your chosen search method is inefficient.

Gateway software isn't for everyone; in fact, certain users are better off without it. For example, the far-greater precision and

control you gain from searching directly with the host service's software may well be worth the initial obstacle of setting up and training.

Two of the big on-line vendors, DIALOG and BRS Information Technologies, have services that are more accessible to the mass market. DIALOG's Knowledge Index and BRS's BRKTHRU use simplified searching methods and provide a lower rate for nonprime-time use. These services contain a great deal on current business and financial news, securities quotes, and investment commentary. On the whole, they are more suited to communications and entertainment than research. If you are taking your information seriously, you may have to go to one of the bigger services.

Assisting Features

If you do decide that your application could benefit from search-assistance software, you'll find that most of the programs available share a set of basic capabilities:

- *Calling the communication network.* Most communication with the on-line host is done through packet carriers like TYMNET, Telenet, Uninet, or the host's own network. During the program set-up, these service's numbers can be embedded so that, with the proper modem, they will be dialed automatically.
- *Log-on protocols.* To make the connection to the host, you must enter the host's symbol, a password, and often a user ID number. These too can be embedded in the program.
- *Off-line query preparation.* Most of

these products permit you to prepare your search statement before actually logging on to the host system, thus saving expensive on-line time. After you have keyed in and checked your query, a press of a function key logs you on to the host, selects the database, and submits the query.

- *Downloading.* Search results can be downloaded onto your own disks for viewing or storage. Some of the packages have features for editing captured data or for shifting it to other programs for analysis, retrieval, and so on.

- *Dumb-communications capability.* Several of these database front-end products can also serve as simple dumb-communications packages for linking with any remote host service. All of these features can be found in conventional communica-

A Few Facts about Gateway Software

	LIST PRICE	REQUIRES	MODEM	BAUD RATE
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PC/NET-LINK Informatics General Corporation 6011 Executive Blvd. Rockville, MD 20852 (800) 638-6595 CIRCLE 663 ON READER SERVICE CARD	\$550	1 megabyte of a 10-megabyte system, one hard disk, DOS 2.0.	Hayes Smart- modem or compatible	300 or 1200
Searchmaster SDC Information Services 2500 Colorado Avenue Santa Monica, CA 90406 (213) 453-6194 CIRCLE 662 ON READER SERVICE CARD	\$229	128K RAM, one drive, DOS 1.x.	Hayes Smart- modem or compatible	300 or 1200
In-Search Menlo Corporation 4633 Old Ironside Drive Santa Clara, CA 95054 (800) 221-4237 CIRCLE 660 ON READER SERVICE CARD	\$495	192K RAM, two drives or one drive and one fixed disk, DOS 2.x.	Any modem	1200

tions software packages for the PC.

In addition, gateway products lead beginners through the steps needed to continue the on-line search. A few packages use a series of subject menus to narrow down your search to one or two databases that cover your subject best. Several other products limit your choice of database by only accessing a few that are of primary interest for the subject you are researching. Some of the packages also help you by conducting the search. They generally do this by prompting you to enter natural-language terms, phrases, or names. It incorporates these into the command language of the host system and submits them. The packages vary in how sophisticated they have made this process; some permit you to enter a few terms only, while others go

through several steps in an attempt to make your search as precise as it would be in the host's command system.

These programs can handle the intellectual tasks of selecting a database and formulating a query, which require experience and judgment. However skillful the programming, these choices are nevertheless part of an automatic reasoning process that is far more limited than that of a skilled human searcher.

You Can't Always Get What You Want

The success of these programs depends on what you expect from them. Will they enable you to conduct an on-line search without training or experience? The answer is a qualified yes. Will they enable you to search like an expert? The answer is

an emphatic no. These products offer you a trade-off. You gain simplicity, but in exchange, you lose much of the host service's searching power: You cannot use all of the search options, you have to accept the strategy that has been programmed in, and one of the best features of on-line software—the ability to search interactively—is limited, often severely.

The extent of the power/simplicity trade-off depends primarily on the nature of the search. You can do a simple, one-concept search very efficiently with these products. If, for example, you want everything on a company from a business database, you enter the firm name, and the host spits out every record it has in which the company's name appears. If, however, you have a complex, multiconcept ques-

ON-LINE SERVICE SUPPORT	UTILITIES SEARCH HELP					
	Auto-dial log-on	Off-line query prep	Down-loading	Dumb comm use	Select database	Prepare search statement
DIALOG, BRS, ORBIT Search Service, National Library of Medicine	Yes	Yes	Yes	Yes	No	Yes
DIALOG, BRS, ORBIT Search Service, Dow Jones News/Retrieval, LEXIS, NEXIS, Westlaw, NewsNet, Questel, National Library of Medicine, OCLC	Yes	Yes	Yes	Yes	Yes	No
DIALOG, BRS, ORBIT Search Service, National Library of Medicine	Yes	Yes	Yes	No	No	Yes
DIALOG	Yes	Yes	Yes	No	Yes	Yes

GATEWAY SOFTWARE

tion, such as the effects of a new technology upon a certain industry, your search is likely to be far less effective.

The Searchers

The first three gateway packages I reviewed, *Sci-Mate Universal Online Searcher* from the Institute for Scientific Information, *PC/NET-LINK* from Informatics General Corp., and *Searchmaster* from SDC Information Services, are intended for use by people with some expertise in on-line data retrieval. All can access several on-line services, especially those that are important in academic and technical research. Besides a basic design more suited to experienced searchers, each pro-

gram allows an expert user to set up a pre-planned search outline so people less conversant with on-line services can carry out an involved search.

Several other products aimed at absolute beginners carry the power/simplicity trade-off even further. Products like *Intersearch* by Menlo Corp., *Search Helper* from Information Access Co., *Searchware* from Searchware, *MicroDISCLOSURE* from Disclosure, and *DunsPlus* from DunsPlus differ from the more-professional programs in two ways: they offer you assistance at each stage of the search process; and all but one of the programs reach only one on-line host—DIALOG by Information Services. DIALOG is chosen

so often by the general-use programs because it has more databases covering more subjects than any other service. It is much simpler to develop a package that is built around one host, and DIALOG is large enough to turn up something in response to most queries.

Here's a look at the packages (see accompanying table, "A Few Facts about Gateway Software," for a listing of further features).

Sci-Mate Universal Online Searcher

The *Universal Online Searcher* is the first front-end package designed to facilitate user access to multiple on-line services, and it is intended for use by experi-

A Few Facts about Gateway Software

	LIST PRICE	REQUIRES	MODEM	BAUD RATE
Search Helper Information Access Co. 11 Davis Drive Belmont, CA 94002 (800) 227-8431 Contact: Cathy Neimeier or David Powell CIRCLE 659 ON READER SERVICE CARD	\$200 per year, 700 searches at \$2.50; 300 at \$3.50.	128K RAM, one drive, DOS 2.x.	Hayes Smart- modem or compatible Bizcomp	1200
Searchware Searchware 22458 Ventura Blvd., Suite E Woodland Hills, CA 91364 (818) 992-4325 CIRCLE 658 ON READER SERVICE CARD	First disk is \$290. Each additional disk \$100.	128K RAM, one drive, DOS 1.0 or 2.0.	Any modem	300 or 1200
MicroDISCLOSURE Disclosure 5161 River Road Bethesda, MD 20816 (800) 638-8241 Contact: Paul Brophy CIRCLE 657 ON READER SERVICE CARD	\$45	192K RAM, one disk drive.	Hayes Smart- modem	300 or 1200
DunsPlus DunsPlus 187 Danbury Road Wilton, CT 06897 (203) 762-2511 Contact: Cathy Groll CIRCLE 656 ON READER SERVICE CARD	\$1,300 for entire integrated package.	256K RAM, hard disk, DOS 2.x.	Any modem	300 or 1200

enced people doing complex searches on a variety of different databases. You are expected to know enough to select your own database and to use a query system that mimics most of the features of the host system. The program's ideal user is a searcher who is adept on one system but cannot keep track of the exact format of comparable commands on several others. Beginning searchers can use the *Universal On-line Searcher* if they know beforehand what database they want to tap because the program gives extensive on-line help to the user. The *Searcher* can be purchased separately or bundled with a companion program, called the *Personal Data Manager*, a database manager equipped with sophis-

ticated retrieval capabilities for bibliographic record files.

PC/NET-LINK

PC/NET-LINK is also designed for experienced searchers who make heavy use of on-line sources. It reaches more on-line services than any other package and therefore concentrates its power on selecting the database. You first cycle through a two-stage menu of subjects to select a small number of recommended databases. When you carry out the search automatically, it gives you no help beyond a short list of the host system's commands. *PC/NET-LINK* has numerous features for off-line query preparation, including prepared searches

that can be executed at any time by users who have had limited experience with on-line database services. It is also distinctive in that you can edit its menus and database descriptions. This useful feature permits the program to be adapted to the needs of any setting.

Searchmaster

Searchmaster is the third front-end product aimed at practiced searchers. It does not offer you assistance in finding a database or setting up the query, but its extensive off-line editing features allow novices to use it. You can preformulate a search with blanks where search terms would be entered. Then, when the search

ON-LINE SERVICE SUPPORT	UTILITIES SEARCH HELP					
	Auto-dial log-on	Off-line query prep	Down-loading	Dumb comm use	Select database	Prepare search statement
DIALOG files: Newsearch, National Newspaper Index, Magazine Index, Trade & Industry Index, Legal Resource Index, Management Contents, Computer Database	Yes	Yes	Yes	No	Yes	Yes
DIALOG	Yes	Yes	Yes	No	Yes	Yes
Disclosure II on DIALOG	Yes	No	Yes	No	No	Yes
Dun's Financial Profiles, Dun's Quest, DunSprint, Dun's Marketing Service, Official Airline Guide, Access to Dow Jones News/Retrieval, NewsNet	Yes	Yes	Yes	Yes	Yes	Yes

GATEWAY SOFTWARE

is actually run, anyone can enter the terms, and the rest is done automatically. This capability is extremely valuable in the many facilities where a lot of repetitive searching is done.

In-Search

In-Search is probably the most heavily marketed of all the search-assistance products. It is a gateway to DIALOG that helps you choose a database and develop a query.

A two-level menu leads to the description of several relevant databases, and after one is selected, a chart-like display is used to enter the terms of the search. *In-Search* is an elaborate program with fancy graphics, a lot of on-line help, and very complete database descriptions. *In-Search*'s manufacturer has also recently announced *Pro-Search*, a professional version of *In-Search* that has additional features for experienced searchers or those who have outgrown the simpler version.

Search Helper

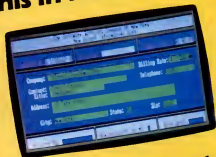
Search Helper is another DIALOG gateway. It reaches only seven of DIALOG's databases, but they are among the most heavily used on the system for information about current affairs, business, commerce, law, and computers. After familiarizing yourself with database contents off-line, you are prompted to enter a very simple search strategy. To display the search results, you encounter *Search Helper*'s distinctive pricing arrangement.

Unlike most of the other products that require you to supply your own password and arrange for billing by the host service, *Search Helper* allows you to prepurchase a set number of "search units": For a few dollars, you get to do one search and download 20 citations. The next 20 citations or another search will cost you another search unit. With *Search Helper* it is virtually impossible to do exhaustive research, but for a quick list of references, it is more convenient than any of the others. It is popular in libraries and in corporate settings where ease and predictability are more important than thoroughness.

Searchware

The products I've discussed so far can be used to retrieve information on a wide variety of subjects. *Searchware* takes the opposite approach with its series of subject-specific packages. *Searchware* comprises 54 separate programs, each one a gateway to a small number of subject-related DIALOG databases. *Searchware* is an unusually flexible program with three levels of search assistance. The first level uses prompts and screens to carry out several of the basic DIALOG features. The later levels introduce more search options

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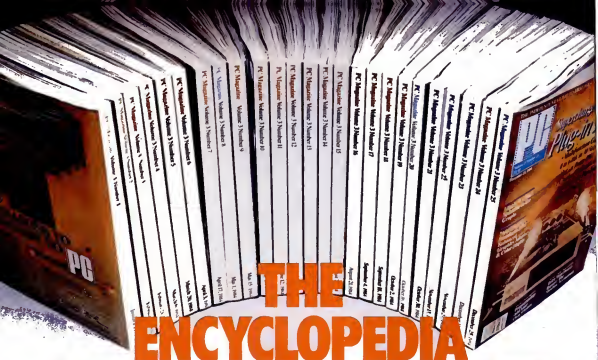
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until at the third level, you have equivalents to most of the DIALOG commands. Because each disk reaches only a few databases, the prompts correspond to individual characteristics of each file, permitting

you to make more-precise searches.

MicroDISCLOSURE

MicroDISCLOSURE also uses the single-subject approach. It reaches only one

DIALOG database, Disclosure II, a heavily used file of financial and descriptive data on thousands of public companies. *MicroDISCLOSURE* translates DIALOG's commands into a double set of menus, one path to reach the record of a certain company and the other to locate all those that have some particular criterion, such as line of business or location, in common. Besides its program disk, *MicroDISCLOSURE* has a reports and analysis disk, where downloaded data can be subjected to a variety of comparisons and analyses. In this respect, *MicroDISCLOSURE* is similar to the software developed by Dow Jones for use with its News/Retrieval service. Programs of this kind are for information analysis as well as information retrieval. Their purpose is less to engage in research on different topics than to transfer data to your PC, where it can be manipulated in a variety of ways.

DunsPlus

DunsPlus also integrates data capture with data analysis. Public database access is actually only one small part of *DunsPlus*, an ambitious integrated program with several other modules, including graphics, spreadsheets, word processing, and communications. The public-database mode accesses several of the Dun & Bradstreet files containing company financial, credit, and marketing data. You use menus to reach the desired data, which can then be easily transferred to other modules. *DunsPlus* also acts as a simple gateway, with no search assistance, to Dow Jones News/Retrieval and NewsNet.

Conclusion

If you don't want to learn to use an on-line service directly, if the scaled-down services aren't enough, or if you prefer to do it yourself, then search-assistance software may be the best way for you to go on-line. Consider it if you have a continuing need for a lot of data, but make sure you're willing to accept the trade-off between simplicity and power. ■

Mick O'Leary is a free-lance writer and consultant. His articles and reviews have appeared in Business Computing, Computer Update, Datamation, Office, On-line, and other publications.



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LANLink and EasyLAN make the RS-232C ports on your PC work like a LAN and save you money, too. RS-232C LANs offer only the basics, however, and rarely connect more than nine stations.

RS-232C LANs: A Basic Bargain

Why buy expensive local area networking boards when you already have one or two perfectly good RS-232C communications ports on your PC? With the right software, you can make an RS-232C port function like a LAN port and save money. The logic sounds compelling.

New products, such as *LANLink* and *EasyLAN*, combine special software with your general-purpose RS-232C hardware to give you LAN capabilities at lower-than-LAN prices. Conventional LAN hardware may be able to do some things faster and more conveniently than software can, but your needs may not require those advantages. If you only need to network a few machines together, one of these two software packages could be an attractive bargain.

LANs Are for Sharing

LANs allow multiple users to share data files, program files, and hardware. As the prices for hard disk drives and printers fall, however, hardware sharing becomes less necessary, except for a device such as a laser printer that is still expensive enough and fast enough to warrant sharing it among several users. RS-232C LANs share peripherals differently from more traditional LANs, but they generally perform this function successfully.

File sharing is, perhaps, the most important function of LANs. The most complex form of file sharing involves simulta-

neous access to the same data files by programs running on several different network systems. This activity requires the LAN software to work with the applications programs to prevent two users from both writing to the same record in a file and incorrectly updating the disk directory. The process that coordinates these actions is known as file and record locking. Not all RS-232C LAN software offers this file-sharing ability, but, then, not all LANs using dedicated hardware and coaxial cable have it either.

LAN Software

The software in any network has to do more than just communicate; other functions like monitoring security are very important, and file spooling is also nice to have.

Most LAN software provides security through the use of passwords. The best systems offer different levels of access that give varied privileges to users. Another form of security makes such devices as a particular disk drive unavailable to some network users.

LAN systems with a printer attached to a central server use two methods to get the job done. The most primitive one serves all users on a first-come, first-served basis. If the printer is busy, the station attempting to use the central printer usually gets a message saying the device is not available. More-helpful programs accept the job and then store the characters and instructions

until the printer is able to accept them.

What's Different?

The major functions of RS-232C LANs are identical to those of dedicated LANs; the main difference, aside from cost and speed, is that a dedicated LAN can serve many more stations than a RS-232C LAN.

When you use the RS-232C hardware that's built into your PC, your only equipment cost is cable. IBM's dedicated PC Network costs \$695 for each network adapter card and \$75 for the network software. But you can share peripherals and exchange files using an RS-232C network for less than \$100 per work station. RS-232C networks don't have all of the functions of more-expensive products, but they do offer the basics.

Dedicated networking hardware takes care of another important job known as network access. Such sophisticated access protocols as carrier sense, multiple access, and token passing are contained in ROM on the networking board. As a result, the network computers are spared the job of controlling network access and can spend more time running applications programs. RS-232C ports aren't as sophisticated as these dedicated ports. They demand attention, and the constant communications through them can slow down applications processing. As a result, the number of stations that can effectively share a central file server in an RS-232C network is smaller than in a LAN.

Conventional LANs are limited by the ability of the file server to support the kind of work being done, but, theoretically, they can connect over 200 stations. IBM limits its network to 72 stations. The maximum number of stations in an RS-232C LAN is limited by the ability of the server to talk to the RS-232C ports. One server can handle eight RS-232C ports through the use of a special interface card.

Cost of Wire

Another difference between these two types of LANs is that they use different kinds of wiring to connect network devices together. Conventional LANs use either twisted-pair wiring or coaxial cable. Twisted pair wiring is inexpensive, but the installation of coaxial cable can be a major expense. You can use both types of wiring for distances of 1,000 feet or more. Coaxial cable is particularly immune to interference from outside sources. The cost of RS-232C cable depends on the number of wires the network actually uses in the ca-

ble. In some networks, the cost of RS-232C cable can equal that of coaxial cable. However, RS-232C wiring doesn't go the same distances or have the same immunity as coaxial or twisted pair cable.

The RS-232C signaling standard de-

RS-232C networks don't have all the functions of more-expensive products, but they do offer the basics.

finies the voltage changes going through a piece of wire that indicate if a 0 or a 1 is being sent. The voltages have to fall within a specific range for the recipient to sense them correctly. The distance you can send an RS-232 signal depends on the kind of wire you use and the electrical environment the wire passes through on the way. If you use standard 22-gauge wire, you should be able to send signals at least 50 feet at speeds over 9600 baud. However, if the wire runs past electrical motors, fluorescent lights, automobile engines, radio transmitters, or other sources of electrical noise, the system may not correctly sense the signals, and you will have to reduce the speed or the distance of transmission.

The RS-232C standard also defines functions for 25 pins on the standard connector. If you had to run cables with 25 wires in them everywhere, the cost for cable could be more than the networking software. Not all RS-232C networks require the same minimum number of wires to make them work and they exceed the relatively conservative engineering standard for speed and distance, but the RS-232C cable is still more expensive than twisted pair.

RS-232C networks aren't everyone's answer to file and peripheral sharing. But if you want to share files between a few PCs in a single room or in a 15,000-square-foot office, they offer a very economical alternative to conventional networks.

LANLink

Software Link, Inc.'s *LANLink* package contains a series of programs that make use of your existing hardware and a

hunk of wire to give you an economical and practical local network. This network also includes dial-in abilities, which even some of the most expensive conventional networks lack. *LANLink* is probably most practical for small numbers of PCs (up to nine machines) and does tie up a serial port in each machine, but within these limits, you can perform the major functions of a local network: sharing equipment and files. *LANLink* should work with any PC (including the PCjr) or compatible that uses MS-DOS and the 8250 UART chip (this includes almost all of the clones except some early Seecua products).

Anything this practical can't be perfect. Since *LANLink* does with software what most LANs do with add-on hardware, the computers on a *LANLink* system have to work harder and, therefore, applications programs run slower. *LANLink* uses one machine, called a server, as the central point on the network, and the machines connected to the server are called satellites. The *LANLink* manual suggests that you use an AT as the network server because of its greater speed and RAM.

Building the Line

Software Link markets a *LANLink* starter kit that includes all of the software for both a server and one satellite station. Additional satellite modules cost \$195 each. The only added costs are for wiring and RS-232C ports. If you are going to connect more than two satellites to a PC or four satellites to an AT, you will need one special multiport RS-232C board for the server. If you are already using all of the RS-232C ports on a satellite PC, you can either buy a special board with added ports or buy an external switch allowing you to share devices attached to a single port.

The first step in setting up a *LANLink* network involves establishing the host software on the PC that is going to act as the network server. *LANLink* requires about 24K RAM to run the server software, and every satellite communicates with programs running in about 40K RAM in the server. A server connected to two satellites would thus use 104K RAM just for server tasks. However, you will need more memory for DOS and any local programs that you might run on the server. The satellite network software uses about

PC FACT FILE

LANLink

The Software Link, Inc.
8601 Dunwoody Pl., #632
Atlanta, GA 30338
(404) 998-0700

List Price: \$495 for a two-station starter kit including software and RS-232C cable; additional stations without cable, \$195 each.

Requires: 128K RAM (add 32K RAM per station) system server with hard disk, standard IBM PC serial port, DOS 3.0 or lower. Each satellite station requires 128K RAM and one disk drive.

CIRCLE 686 ON READER SERVICE CARD

EasyLAN

Server Technology, Inc.
1095 E. Duane Ave., #107
Sunnyvale, CA 94086
(800) 835-1515
(408) 738-8377 (in Calif.)

List Price: \$179.95 for a starter kit for two systems, including 30-foot cable, manuals, and software. Extra software and 30-foot cable, \$109.95.

Requires: 128K RAM, DOS 2.0 or higher, a serial communications port.

CIRCLE 685 ON READER SERVICE CARD

24K RAM on each satellite machine.

Many people underestimate the difficulty of setting up all LAN software. They become frustrated with the large number of details that have to be exactly right to get two computers to communicate. *LANLink* is easier than most networking programs to configure if you have the manual in hand. The manual is clearly written and illustrates the instructions with many drawings and useful examples. But, if you ever lose the manual, you're in trouble because the software doesn't prompt you or provide menus.

Using the manual, I configured *LANLink* server the way I wanted it and set up the software for the satellite machine in about 20 minutes. It takes only minutes more to attach an additional satellite.

A PCjr with a Hard Drive

After installing *LANLink* and hooking up the machines, I typed DIR C: on my PCjr. That command was automatically routed to the hard disk drive in the XT I was using as a file server. For all practical purposes, I had added a hard drive to my Junior. The operation was slower than you would normally expect for a dedicated hard drive, but I could run any program on the XT's drive and use all the DOS file commands. Similarly, I could print any file on the server's printer.

One of the *LANLink* programs turns the PC acting as the server into a multitasking or time-sharing computer. The memory of the server is divided into partitions by the software, and each partition runs programs that control and communicate with the satellite. The partitions and any applications programs running on the server takes turns getting the attention of the CPU.

You can configure *LANLink* so that one or more drives on the server are natural extensions of any number of drives on the satellite. If you only have one drive, for example, the server's drive becomes your B: drive. On the XT in my *LANLink* network, however, something seemed wrong. The familiar *WordStar* menu took much longer than usual to appear on the screen, and it took a surprisingly long time to jump to the bottom of a file. If both satellites and the server all tried to write to or read from the hard disk at the same time, all the stations were delayed. Sharing re-

sources just isn't the same as having it all to yourself.

File Sharing

LANLink is excellent for using and transferring files or for applications where

One of the *LANLink* programs turns the PC acting as the server into a multitasking or time-sharing computer.

only one user at a time will access a data file, but if you need simultaneous file access, you should check with Software Link to determine if your applications software will work with its networking software in this mode. In its present form, *LANLink* can handle file and record locking with only a limited number of applications programs, but Gary Robertson, director of Marketing and Sales for Software Link, says that his company is working with a number of other software manufacturers that wish to integrate their software with the *LANLink* file- and record-locking scheme. Robertson also indicates that *LANLink* would be compatible with the networking module in DOS 3.1.

Software Functions

LANLink performs the important basic software functions and one or two of the "nice to have" ones including file spooling. It uses a password-protection scheme to allow you to access the server. The server and satellite stations can designate the hardware available to the network, so that you can keep private files on a drive that other network users can't access.

The software incorporates a priority system that permits certain satellites to take more of the server's processing time than others. This priority assignment should be made if one satellite has some tasks to be done on the server which require heavy use of the disk drives or peripherals.

LANLink takes all information directed to the printer and puts it in a disk file to wait for printing. In addition, it continually updates a status display and accepts commands to control printing operations.

One software function that *LANLink* lacks is a practical capability to send messages between satellite stations. These could take the form of either real-time chat messages or more sophisticated electronic mail, but *LANLink* has neither. Some kind of communications feature is very valuable during any LAN operation for coordination if nothing else.

The ability to dial into a network through a telephone modem is a valuable feature that many LAN vendors have been slow to supply. You can use the *LANLink* software with any auto-answer modem for remote entry. A user with a PC running the satellite software can dial into the server and be recognized by ID and password. If the ID and password are not correct, the software will toggle the modem's data-terminal-ready line, causing most modems to hang up. The use of the standard RS-232C interface for *LANLink* makes it easy to connect to a modem for remote entry.

CONFIG.SYS Statements

My major criticism of the *LANLink* satellite software is that it uses a special statement contained in a CONFIG.SYS file to modify the operating system with special code for driving data in and out of the serial port. Technically, this is a fine way to make the modifications, but it has some practical drawbacks.

A lot of other PC accessories and programs use the DEVICE = statement in the CONFIG.SYS file. If you are using almost any add-on hard disk drive, some RAM-disk software, and some particular specific database management and graphics programs, you may already have a DEVICE = statement in your CONFIG.SYS file. The use of the DEVICE = statement could lead to a complete incompatibility between the device you already have and the network. Some hardware manufacturers, such as Quadram, get around the use of this statement by putting the needed code in ROM, but many other hardware and software products use this file. If none of the machines you want to connect together already use a CONFIG.SYS file with a DEVICE = statement, then you can use the *LANLink* software if you are running the right version of DOS and have an IBM standard communications port.

LANLink only uses three wires (RS-

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232C pins 2, 3, and 7) to communicate between computers. As an experiment, I connected a DataVue 25 to the COM1 port on my XT using 50 feet of standard RS-232C cable. I connected a PCjr to COM2

using 75 feet of four-conductor flat telephone wire. Both systems worked fine. If your electrical environment is quiet, you can use relatively inexpensive wire to establish a LANLink network, and you may

be able to use up to 1,000 feet of wire for each satellite-to-host connection.

Try It, You Might Like It

Software Link came up with a practical way to give free trials without risking theft from software copiers. Each LANLink package comes with one non-copy-protected disk containing programs that run—but quit after about 15 minutes. They can be restarted, but, obviously, this isn't acceptable for a permanent situation. If you try the demonstration software and decide you don't like LANLink, you can return the package for a complete refund. The real program disk is encrypted and cannot be run until you open a sealed envelope and type in the key it contains. Once you open the sealed envelope, you own the software. This scheme protects both the user and software house and doesn't impose a real inconvenience on the user.

LANLink represents an inexpensive way to share resources between a limited number of PCs. It can considerably slow down the operation of the file server, but in many situations that may be an acceptable trade-off for low cost and ease of use.

EasyLAN

Server Technology, Inc.'s EasyLAN is probably the ultimate example of practicality in local-area networks. It doesn't do anything as fancy as simultaneous file access, but it does allow file and peripheral sharing among computers for less than \$100 per network station.

The EasyLAN programs give each networked computer the ability to execute several special DOS commands on any machine it is connected to by RS-232C cable. The RS-232C connection can be through a modem, making dial-in operation possible. These EasyLAN DOS commands let a remote user see the directory of a host machine's disk, erase and rename files on the host, copy files between drives on the host and remote, and print a file on the host's printer. However, you can't remotely run programs or access files.

Because EasyLAN keeps things simple, network stations don't seem to lose much speed doing their regular processing jobs unless a remote user is transferring some big files at the same time you are trying to access a disk drive.

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Getting Together

EasyLAN works best in applications that hook only two machines together or hook two machines to a third. Extended systems that connect up to ten machines are possible, but they require special communications boards, and performance would probably suffer.

Server Technology markets an *EasyLAN* starter kit that includes two copies of the software with different serial numbers, manuals, and a 30-foot cable for \$179.95. An expansion kit for a single added system costs \$109.95 and includes a disk and 30-foot cable. These kits let you connect together any PC (including a PCjr) and compatibles running DOS 2.0 or higher with IBM standard serial ports. The *EasyLAN* manual says that each machine should have a minimum of 128K RAM. Since the *EasyLAN* software uses about 64K RAM, you probably need more memory to use most programs.

Machines linked with *EasyLAN* do a lot of electrical "handshaking" through the RS-232C ports, so they require connecting cables with eight wires in them. Server Technology sells 30-foot cables with connectors for \$49.95. If you need longer cable runs, they are available, but you may find your office floor plan or working configuration dictated by the length of the cables you can employ.

Booting Up

The software comes ready to run with two machines. All you have to do is copy the distribution disk onto your own disks with DOS, build an AUTOEXEC.BAT file, and connect the machines together with the cable. You can be "on the air" within 5 minutes. The AUTOEXEC.BAT file will contain, among other things, the passwords and access restrictions that make up *EasyLAN's* easy-to-use and effective password-protection scheme.

The special *EasyLAN* DOS commands for remote operation of another machine are as flexible as any DOS commands and no harder or easier to use. They can use all of the DOS 2.0 features such as pathnames, subdirectories, and wild cards. The only difference is the addition of a machine designation (PC1:, PC2:, and so forth.) before the disk drive designation. If you have inexperienced users on the net-

work, I would suggest that you build clearly named batch files containing the commands and extensions needed to perform each person's commonly used functions. This won't take much time, and it will save

frustration and the need for training.

The print and file transfer operations in an *EasyLAN* system are done in the background mode. The person actually using a machine serving as a host for someone else

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CIRCLE 166 ON READER SERVICE CARD

doesn't have to do anything special or even to know when a remote is using the acting host's resources. When a remote user wants to print a file, the *EasyLAN* background printing program automatically

spools the file to disk and schedules it for later printing on a specific printer attached to the host PC. Similarly, when you issue the *EasyLAN* EZCOPY command, the network carries out data transfers between

interconnected PCs while applications programs run concurrently.

In practice, this worked surprisingly well because of some special *EasyLAN* features. I knew from previous experience with LAN software that it is often possible to trash *WordStar* text files by writing and reading them from two machines at the same time. I first started editing a file on the host under *WordStar*. Then, from the remote machine, I started a transfer of the same file from the host to the remote. When the transfer started, I issued the *WordStar* command to save a file. I was amazed to see the file transfer halt and then begin afresh after the save was completed. The updated file was transferred even though I began the save well after the transfer. That's not bad for \$100 software.

You can instruct the *EasyLAN* software to dial and answer the phone automatically through a modem. In other words, when you boot the network software, the system can automatically establish communications with another system. The software responds when a modem answers a ringing phone line and operates with a remote system just as if it were connected directly, except it runs more slowly.

Interrupted Addresses

When you add devices to a computer, particularly complex I/O devices, you always risk conflict between the add-ons. *EasyLAN* and my add-on hard disk drive both wanted to use the same interrupt address. Luckily *EasyLAN* is flexible enough to deal with the problem. When I first tried to load *EasyLAN* into my big system, everything locked up, but a simple command in the AUTOEXEC.BAT file allowed the interrupt to be changed to a free address. The manual makes recommendations about the addresses that you can use. It took only seconds to make the change, but this is another example of the problems you can run into as you improve the basic IBM product.

The key word of *EasyLAN* is practical. It beats carrying disks between machines and yet doesn't impose heavy costs or operating burdens on the users. If it does all you need, why spend more? ■

Frank J. Dertler, Jr., is a contributing editor for PC Magazine.

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DATACOPY
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End Big Blue's Backup Blues

More intelligent than COPY and more flexible than BACKUP, this issue's BAC.COM utility speeds you through a chore you can't afford to neglect.

Backing up the data and program files you have stored on your disks is a little like taking out the garbage or changing the cat's litter box—it's something you don't like but have to do simply to survive. In a world where magnetically encoded data is easily susceptible to casual destruction, the consequences of not backing up your data are too unpleasant to contemplate.

Backups should be made on a regular basis whether you work with a floppy disk-based PC or with a hard disk machine such as in the XT or enhanced AT. Unfortunately, PC-DOS doesn't make the job very easy. Floppy disk users can make use of the DISKCOPY command to make bulk backup copies of their disks. Users with hard (Winchester) disks, however, are stuck with the PC-DOS BACKUP command. This latter makes copies of files that cannot be used until after they have been returned to the original disk by using the RESTORE command.

Neither command works very quickly, so many users prefer the COPY command as a faster alternative. With COPY they can make discretionary incremental backups of only the files that have been changed since the last backup was made. For Winchester disk users, COPY offers the added benefits of quick restoration, the ability to peek at the last version of a file, and the ability to use the file directly on another system should yours go down because of a hard disk failure—facilities you lose with the BACKUP command. (Please note, however, that there is no good substitute in the standard PC-DOS environment for BACKUP and RESTORE when it

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comes to making periodic, say, weekly, backups of your *entire* hard disk.)

There are two problems with using COPY as a general backup utility. First, the task of deciding which files to back up is left up to you. If you're at all like me, that means you copy all the files in a directory or on a disk rather than chance missing one you forgot you had changed. That can take a long time. The other problem is that if you're copying a large directory from a Winchester disk to a floppy disk, the target floppy can get full if you copy all the files to it. Deciding which files did and did not get copied to the first disk and then copying each remaining one to a second disk is a major annoyance.

All that's really needed to cure both of these ills is a command that's slightly more intelligent than COPY, but without all the sophistication of BACKUP. The com-

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mand should copy only the files that have been altered onto a target floppy disk, and should be able to continue on to a new disk when the original fills up. Fortunately, it isn't very difficult to create an assembly language command called BACopy that does the trick.

Copy and BACopy

BACopy works very much like the COPY command, even down to using almost the same source-to-target syntax:

```
Id1[|path|filename[.ext] Id2[|path|
```

Like COPY, BACopy allows making backup copies of files from any source disk and directory to any target disk and directory. This lets you make spare copies on the same disk in different directories, for example. It also allows PC-DOS wildcard notation to be freely used.

The only exception to COPY's syntax is that BACopy does not allow renaming the file during the copy process. To do so would make the backup strategy needless-

ly confusing. (You could, of course, fool BACopy into making extra copies by renaming files on the target disk when it's through working, but that's up to you.)

BACopy doesn't quit if you run out of disk space. It recovers from a target disk-full error by asking you to insert another one so it can continue with its work.

BACopy makes more important exceptions to COPY's rules when it comes to how the program works. BACopy checks for the existence of each file you requested it to copy on the target disk. If the file is not on the target, BACopy goes ahead and copies the original to the target, just as COPY does. If the file is already on the target disk, however, BACopy compares the save date and time of the source and target

files and only copies the original to the target if the original file is newer.

The other exception to COPY's procedure is that BACopy doesn't quit if you run out of disk space. It recovers from a target disk-full error by asking you to insert another one so it can continue with its work.

BACopy does not disturb the archive bit in the source file's directory. This bit is used to indicate whether or not a backup has been made. As it was designed to be, changing the archive bit remains the prerogative of the BACKUP command. BACopy's backup strategy does depend on you to set your PC's clock to the correct time and date when you start your system, of course. If you do that, your file's time and date stamps will correctly indicate if and when you have modified your files.

Your Copy of BACopy

The source code for BAC.COM is written in assembly language, and the full, commented listing is too long (7 pages) to be printed here. You can obtain BACopy in its assembler version either by down-

```
100 ' Program for creating BAC.COM
110 CLS:PRINT "Checking DATA; please wait..."
120 FOR B=1 TO 87
130 FOR C=1 TO 17
140 READ A$:IF C<17 THEN 160
150 Z#=Z#+VAL(A$)
160 NEXT:NEXT
170 IF Z#=105881 THEN RESTORE:GOTO 200
180 PRINT "ERROR: CHECK THE LAST NUMBER IN"
190 PRINT "EACH DATA STATEMENT--THEN REDO":END
200 FOR B=1 TO 87
210 FOR C=1 TO 16
220 READ A$:TTL=TTL+VAL("&H"+A$)
230 NEXT
240 READ S$:IF S=TTL THEN 270
250 PRINT "DATA ERROR IN LINE";B*10+330
260 PRINT "CHECK FIGURES AND REDO":END
270 TTL=0:NEXT:RESTORE
280 OPEN "BAC.COM" AS #1 LEN=1:FIELD #1,1 AS D$
290 FOR B=1 TO 87
300 FOR C=1 TO 16
310 READ A$:LSET D$=CHR$(VAL("&H"+A$))
320 PUT #1:NEXT:READ DUMMY$:NEXT:CLOSE
330 PRINT "BAC.COM CREATED"
340 DATA E9, 97, 02, 42, 41, 43, 6F, 70, 79, 20, 20, 43, 29, 20, 31, 39, 1246
350 DATA 38, 35, 2C, 28, 44, 69, 63, 6B, 69, 6E, 73, 6F, 6E, 20, 41, 73, 1327
360 DATA 73, 6F, 63, 69, 61, 74, 65, 73, 20, 49, 6E, 63, 2E, 0D, 0A, 24, 1278
```

Figure 1: BASIC program to create BAC.COM. The lines with only zeros must be entered as shown (figure continues for 2 more pages).

The listing shown here as Figure 1 is a BASIC program that, when you load and run it, will automatically create BAC.COM for you. You can enter BACOPY.BAS at your keyboard or—since typing in

(Figure 1 continues)

If you believe these simple facts about hard disks, you'd be willing to pay more for ours.... fortunately, you won't have to

Avoiding hard disk failures and loss of data is just one of the reasons to buy our hard disks.

Hard disks can fail—there's really no other nice way to say it. Even IBM has problems delivering ATs with hard disks that work. We're not talking about nice, clean, clear-cut failures where the drive seizes up, coughs, and rolls over and dies. We're talking about the insidious little creeping failures that sneak up over time—like a missing sector here or a lost sub-directory there.

There are precautions you can take to protect against failure and ultimate loss of data. Here is what we contribute toward minimizing the potential loss of your data.

Best Drives Available

First, we buy the best drives available. Sounds trite, doesn't it? I mean, a drive's a drive—right? Hardly. You should see some of the junk we get in our labs. Some have such high failure rates that we even questioned our own \$10,000 hard disk tester. But when we tested other manufacturers' drives we were assured that our equipment was fine, which just confirmed that the bad hard disks were not only bad—they were real bad.

But that's just the weeding out process. We then take each drive that we've put through our tester and test it again with the controller you've requested. We call this a "tested pair."

DOS Doesn't Do It

In case you're thinking that all

this is an unnecessary duplication of what DOS does for you, let me explain the disk facts of life.

If DOS did what you may think it is supposed to do when you format the disk, DOS would map around these bad areas. Unfortunately, DOS doesn't do this.

DOS 2.0 and 2.1 can't enter the bad tracks. DOS 3.0 can, but only on the IBM AT. Unfortunately, as the press has so well documented, the AT's hard disk develops bad tracks later on.

We do what DOS can't

We believe the problem is so bad, we use a software program that performs a powerful test of your disk drive on all of the IBM or IBM compatible computers—PCs, XT's, and AT's. Our format takes hours to analyze the disk. But when we finish, you know that the bad tracks are really mapped out so you won't write good data that will disappear into a black hole. We even send you a printed statement of our test results.

Our software allows you to type in the bad track locations from the list supplied by the manufacturers, so you'll never write good data to them—even if DOS didn't identify them as bad. The software even lets you save the location of these bad sections to a file, so that you can reformat your disk without spending hours retesting.

We even include a program that will give you continuous comments on the status of your hard disk. No more waiting for that catastrophic failure.

Average Access Time

As you might suspect, some hard disks are faster than others in their ability to move from one track of data to another. The time it takes the hard disk to move one-half way between the beginning of the disk to the end is called the "average access time."

The first generation of 10 megabyte hard disks had average access times of 80-85 milliseconds (msec). But computer users love speed, and guess what—the average access time for the new 20 megabyte hard disk in the IBM AT is only 40 msec. (We sell an AT equivalent with only 30 msec access time!)

There are some legitimate reasons for the shorter access time. It's particularly helpful when there are multiple users on the same hard disk. It's also important when running a compiler. But remember, before you get too wrapped up in the access speed, there's always that ST 506 interface which won't let data transfer from the hard disk to the computer any faster than 5 megabits/second. We've bypassed that choke hole, too. If you want the functional equivalent of a Ferrari with a turbocharger, order our 10 Mbit per second 108

megabyte hard disk with 18 msec of average access speed.

Compatibility

To be sure that your hard disk is 100 percent compatible with the IBM XT you don't need to buy the same hard disk that's in the IBM XT. You can't even be sure what brand hard disk it is because IBM, like Express Systems, goes into the marketplace and buys hard disks from several vendors. However, they buy their XT hard disk controller from only one vendor—the same one we do.

You can buy the IBM XT controller from IBM for \$495 or you can buy from us, the functional equivalent, manufactured by the same company that makes it for IBM for only \$195. Is it the exact identical IBM XT controller? No, it's better. First, it takes less power, and secondly, it can control from 5 to 32 megabytes—the IBM controller can only work with only 10 megabytes. It is 100 percent IBM XT compatible, and 100 percent is 100 percent. If you want to save a slot, we carry a version that lets you operate two hard disks and two floppy disk drives.

More than 32 Megabytes

You can operate with more than 32 megabytes (the limit of DOS) through the use of "device drivers." Express Systems can supply you with device drivers for our hard disks for over 32 megabytes formatted. But, if you don't have individual files, or databases that are large, you might want to consider one of our controllers that can divide our 65 megabyte (formatted) hard disk into two equal volumes of 32 megabytes each.

Reliability

We offer you a choice between iron oxide and plated media—the stuff that covers the hard disk and gives it its magnetic properties. Iron oxide is...well, it's rust. If you inadvertently touch your disk, you may cause the low flying head to dig out some iron oxide. A little rust flake can ruin your whole day. Plated media is more resistant to damage, and if it happens, less data is lost.

We offer both types of hard disks. The iron oxide is older

IBM

IBM

technology, and quite frankly, manufacturers understand it better. Their better understanding, combined with some of the special head locking mechanisms, gives us peace of mind when we sell you one.

Power

Hard disks consume power. Our small, half-high hard disks consume so little power that you can use them with your existing IBM PC power supply. If you plan to use lots of slots, you'll want to increase your power supply to be safe. We offer the same amount of power for your PC that comes in the XT.

Our Customers

Some folks just never feel comfortable buying mail order. They forget that Sears began as a mail order house or that IBM is now into mail order. But, if it helps, here is a partial list of customers who have felt comfortable to buy from us.

IBM	Sears
American Express	Honeywell
U.S. Army	MIT
AT&T (Bell Labs)	RCA
Bausch & Lomb	Lockheed
Xerox	Sperry

Easy to Install

If you're like most of us, raised on the boob tube rather than the Great Books, you'd rather see the movie than read the book. Well, now you can choose to read our installation manual or for only \$9.95 more, you can get a VHS or Beta video cassette showing the simple steps for installation.



Our VHS or Beta Cassettes make installation easy.

Warranty

We offer you a one year warranty on our hard disks—the same as IBM on the AT and 90 days on the tape drives. (It's all the manufacturer gives us.) If



Complete Hard Disk Kits

Formatted Storage Capacity in Mbytes	Height	Plated Media	Average Access	Transfer Rate	PC or PC/XT	AT
10	1/2	yes	85 msec	5 Mbits/s	\$ 625	\$ 430
10	Full	yes	85 msec	5 Mbits/s	\$ 625	\$ 430
21	1/2	yes	85 msec	5 Mbits/s	\$ 825	\$ 630
21	Full	no	30 msec	5 Mbits/s	\$ 1,535	\$ 1,340
32	1/2	yes	85 msec	5 Mbits/s	\$ 1,095	\$ 895
32	Full	no	30 msec	5 Mbits/s	\$ 1,775	\$ 1,575
65	Full	no	30 msec	5 Mbits/s	\$ 2,295	\$ 2,070
108	Full	yes	18 msec	10 Mbits/s	\$ 4,995	\$ 4,995

Removable Hard Disk

10	1/2	no	90 msec	5 Mbits/s	\$ 1,095	N/A
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Tape Systems and Subsystems

Formatted Storage Capacity	Height	Data Transfer Rate (K/sec)	PC or PC/XT	AT
60 Mbytes	1/2	88	\$ 995	\$ 995
60 Mbytes Subsystem		88	\$ 1,295	\$ 1,295
17.6 Mbytes Start/stop Subsystem		24	\$ 795	\$ 795

Controllers

All of our hard disk and tape controllers are available separately. Please call for prices.

Subsystem Chassis

Any of our disk or tape units are available in an external subsystem for an additional \$250.00. You can mix & match any of our 1/2 high hard disks or tape drives together or add any single full height hard disk.

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*with the purchase of any drive

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Call our friendly, knowledgeable customer service staff to get answers to your questions—before or after the sale. Our people, who know the PC, can talk you through the sticky parts, and they'll respond to you quickly. Just call us.

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(Figure 1 continued)

870	DATA	8B,	FE,	3C,	5C,	74,	11,	00,	3E,	7D,	01,	02,	75,	07,	80,	3E,	7F,	1437
880	DATA	01,	3A,	74,	03,	B0,	5C,	AA,	89,	3E,	CC,	01,	EB,	07,	90,	C7,	06,	1611
890	DATA	CC,	01,	7E,	01,	B8,	FF,	FD,	8D,	16,	65,	06,	2B,	C2,	A3,	66,	02,	1798
900	DATA	33,	C0,	B4,	1A,	8D,	16,	D2,	01,	CD,	21,	8D,	16,	31,	01,	B4,	0E,	1532
910	DATA	B9,	00,	00,	CD,	21,	73,	07,	8D,	16,	D1,	02,	E9,	81,	01,	C6,	06,	1486
920	DATA	68,	02,	00,	8D,	36,	F0,	01,	8B,	3E,	CA,	01,	56,	B9,	0D,	00,	F3,	1473
930	DATA	A4,	8B,	3E,	CC,	01,	5E,	B9,	0D,	00,	F3,	A4,	B4,	1A,	32,	C0,	8D,	1858
940	DATA	16,	FE,	01,	CD,	21,	B4,	4E,	8D,	16,	7E,	01,	B9,	00,	00,	CD,	21,	1486
950	DATA	72,	2B,	8D,	36,	EA,	01,	AD,	8B,	D0,	8D,	36,	16,	02,	AD,	3B,	D0,	1766
960	DATA	77,	1B,	75,	13,	8D,	36,	E8,	01,	AD,	B8,	D0,	8D,	36,	14,	02,	AD,	1620
970	DATA	3B,	D0,	77,	09,	EB,	01,	90,	E8,	40,	01,	E9,	F8,	00,	B4,	3D,	8D,	1935
980	DATA	16,	31,	01,	B0,	00,	CD,	21,	A3,	CE,	01,	73,	0D,	8D,	16,	E0,	02,	1373
990	DATA	C7,	06,	CE,	01,	00,	00,	E9,	06,	01,	33,	C0,	B4,	3C,	8D,	16,	7E,	1424
1000	DATA	01,	33,	C9,	CD,	21,	A3,	D0,	01,	73,	0D,	8D,	16,	F4,	02,	C7,	06,	1605
1010	DATA	D0,	01,	00,	00,	E9,	E8,	00,	8D,	36,	31,	01,	AC,	3C,	00,	74,	08,	1275
1020	DATA	8A,	D0,	B4,	02,	CD,	21,	EB,	F3,	B4,	09,	8D,	16,	5D,	03,	CD,	21,	1930
1030	DATA	B4,	3F,	8B,	0E,	66,	02,	8B,	1E,	CE,	01,	8D,	16,	65,	06,	CD,	21,	1384
1040	DATA	3D,	00,	00,	74,	53,	8B,	C8,	3B,	0E,	66,	02,	74,	05,	C6,	06,	68,	1205
1050	DATA	02,	01,	51,	B4,	40,	8B,	1E,	D0,	01,	8D,	16,	65,	06,	CD,	21,	59,	1303
1060	DATA	3B,	C1,	74,	2B,	EB,	B3,	00,	B4,	41,	8D,	16,	7E,	01,	CD,	21,	8D,	1736
1070	DATA	16,	09,	03,	B4,	09,	CD,	21,	B4,	08,	CD,	21,	3C,	0D,	75,	F8,	B9,	1510
1080	DATA	02,	00,	8D,	16,	74,	03,	B4,	09,	CD,	21,	E2,	F6,	E9,	EF,	FE,	80,	2837
1090	DATA	3E,	68,	02,	01,	74,	02,	EB,	98,	B4,	57,	B0,	00,	8B,	1E,	CE,	01,	1493
1100	DATA	CD,	21,	B4,	57,	B0,	01,	8B,	1E,	D0,	01,	CD,	21,	E8,	6B,	00,	8D,	1778
1110	DATA	16,	63,	03,	B4,	09,	CD,	21,	8D,	36,	7E,	01,	AC,	3C,	00,	74,	08,	1229
1120	DATA	8A,	D0,	B4,	02,	CD,	21,	EB,	F3,	8D,	16,	74,	03,	B4,	09,	CD,	21,	1953
1130	DATA	C6,	06,	69,	02,	01,	33,	C0,	B4,	1A,	8D,	16,	D2,	01,	CD,	21,	B4,	1553
1140	DATA	4F,	B9,	00,	00,	CD,	21,	73,	03,	EB,	04,	90,	E9,	90,	FE,	00,	3E,	1824
1150	DATA	69,	02,	01,	74,	08,	8D,	16,	77,	03,	B4,	09,	CD,	21,	CD,	20,	52,	1263
1160	DATA	B4,	09,	8D,	16,	6A,	02,	CD,	21,	B4,	09,	5A,	CD,	21,	B4,	09,	8D,	1545
1170	DATA	16,	47,	03,	EB,	04,												

all of the DATA lines without error is by no means a feat that is accomplished effortlessly—you can download it from PC's Interactive Reader Service. Or, for the ultimate in convenience, you can simply download the ready-to-run BAC.COM from PC-IRS.

[On our modem reader dual-up service the filename BACOPY.ASC has been changed to BACOPY.BAS so it can be downloaded by readers whose modem software is restricted to ASCII (rather than the preferred Xmodem) transmission. Simply use your RENAME command to change BACOPY.ASC back to BACOPY.BAS after you have received the file. To download BAC.COM directly, you must use Xmodem. You must specify that you will be using the Xmodem file transfer protocol when you log on, or change to it with the Utilities option.—Ed.]

How BACopy Works

Going through the assembler listing step-by-step is always the best way to understand a program; however, until you get a copy, this brief outline of the major steps may be useful to those interested in programming. I'll indicate references to labels in my actual source code by putting them in parentheses.

Like most programs, BACopy starts out by parsing the command line. Here we need to know the source disk, directory and filename (including extension, if present), as well as the target disk and directory. The code in BACopy will look familiar to those of you who worked with the RE-Direct program (*PC Magazine*, Volume 4 Number 4). That's no surprise, since it's the same, and you can just copy it into your new file if you have a working copy of RE-Direct's source code.

PC-DOS function calls 4EH and 4FH are used to find the source file: This technique is what allows wildcards to be used. (The process starts at FIND_FILE for the first file, and NEXT_FILE for subsequent ones.) As each file is found, the target file is looked for by using function call 4FH (starting at the label FIND_TARGET). If the target is not found, BACopy goes directly to the routine for opening the source file, creating the target and copying the source file into it (jumps to the label OPEN_SOURCE).

If the target file exists, the save dates and times of the two files are compared. I do this by looking at the words at byte 24 (date) and byte 22 (time) in the Disk Transfer Area (DTA) for each file. (A PC-DOS function call, 57H, would do this, but it takes longer than my procedure because the files have to be opened first.) If the date

of the target file is the same or newer than that of the source file, BACopy won't make a new copy (it jumps to label DONT_COPY). In this case a utility subroutine (CLOSE_ALL) is called to make sure any open files are closed. The program then goes on (to NEXT_FILE) to look at the next file.

When a target file must be created, the source file is opened (starting at label OPEN_SOURCE), and a file handle is assigned by calling PC-DOS function call 3DH. The target file is then created by using function 3CH. A handle for the target is assigned to PC-DOS when 3CH is called. The reason BACopy creates the target, rather than opens it, is two-fold. First, the same code works whether or not the target file exists, and second, the file size in the directory entry will be correctly updated when the new copy of the file has fewer bytes than the old version.

Blocks of data are then moved from the source file into memory and then to the target file. (This begins at label PROCEED_TO_COPY.) The size of each block (BLKSIZE) is determined by the distance between the top of available memory (which is just below the stack area of a .COM file) and the end of the pro-

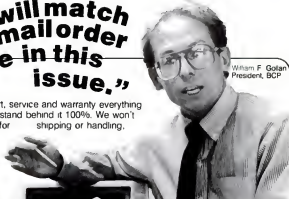
gram. Unless no bytes were read, the write request (PC-DOS function call 40H) asks that the same number of bytes read from the source file be written to the target file.

If the requested number of bytes was

written, so the program has not reached the last block, BACopy returns (to PROCEED_TO_COPY) and continues working. If it hits the last block of data, BACopy jumps to the clean-up routines (label FINISH).

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Wham F. Golan
President, BCP

BACopy is a fraction of a second slower per file than COPY when you're running it for one file, but it saves time as you update your overall group of files.

gram. (That number was determined by the four lines of code underneath the label BUFFER_SIZE earlier in the program.) The current version of BACopy yields a BLKSIZE of about 62K bytes, which is about the size of the memory buffer used by the COPY command.

Using function call 3FH, each read request asks PC-DOS to read the BLKSIZE bytes. If fewer are returned than expected (this can be determined by looking at the AX register when Interrupt 21H returns), the last available block of data has been

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Verbatim SS/DD (11)	19.95	GB Gold w/64K	469.95	DJ Mail Mng. +	149.95	F 15	24.95
Maxell SS/DD (10)	18.95	GB Silver w/64K	234.95	DJ Spinh Link +	149.95	Flight Simulator	34.95
Maxell DS/DD (10)	26.95	GB Silver w/384K	289.95	Dollars & Cents	109.95	Gato	27.95
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In the course of selling more than a million diskettes every month, we've learned something: higher prices don't necessarily mean higher quality.

In fact, we've found that a good diskette manufacturer simply manufactures a good diskette...no matter what they charge for it. (By way of example, consider that none of the brands that we carry has a return rate of greater than 1/1,000th of 1 percent!)

In other words, when people buy a more expensive diskette, they aren't necessarily buying higher quality. The extra money may be going toward flashier advertising, snazzier packaging or simply higher profits.

But the extra money in a higher price isn't buying better quality. All of the good manufacturers put out a good diskette Period.

How to cut diskette prices ...without cutting quality.

Now this discovery posed a dilemma: how to cut the price of diskettes without lowering the quality.

There are about 85 companies claiming to be "diskette" manufacturers.

Trouble is, most of them aren't manufacturers. Rather they are fabricators or marketers taking other company's components, possibly doing one or more steps of the processing themselves and pasting their labels on the finished product.

The new Eastman Kodak diskettes, for example, are one of these. So are IBM 5 1/4" diskettes. Same for OYSAN, Polaroid and many, many other familiar diskette brand names. Each of these diskettes is manufactured in whole or in part by another company!

So, we decided to act just like the big guys. That's how we would cut diskette prices...without lowering the quality.

We would go out and find smaller companies to manufacture a diskette to our specifications, specifications which are higher than most...and simply create our own "name brand" diskette.

Name brand diskettes that offered high quality at low prices.



Super Star diskettes are sold in multiples of 50 only. Diskettes are shipped with white Tyvek sleeves, reinforced hubs, user 10 labels and write protect tabs.

Boy, did we get lucky. Our Super Star Diskettes are the same ones you've been using for years...without knowing it.

In our search for the low priced, high quality diskette of our dreams, we found something even more interesting.

We found that there are several manufacturers who don't give a hoot about the consumer market for their diskettes. They don't spend millions of dollars in advertising trying to get you, the computer user, to use their diskettes.

Instead, they concentrate their efforts on turning out the highest quality diskettes they can...because they sell them to the software publishers, computer manufacturers and other folks who in turn put their name on them and sell them for much higher prices to you!

After all, when a software publisher or computer manufacturer or diskette marketer puts their name on a diskette, they want it to work time after time, every time. (Especially software publishers who have the nasty habit of copy-protecting their originals!)

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PROGRAMMING

There it uses PC-DOS function call 57H to get the source file's time and date stamp and apply it to the target file (writing into the DTA doesn't do the trick, though you might think it would). If BACopy didn't do it this way, the target file would have the current time and date in its directory when it gets closed, and part of BACopy's design purpose would be defeated. Again, this exactly parallels the COPY command.

If the requested number of bytes was not written, it means that the target disk is full. Rather than just quit, however, as the COPY command does, BACopy provides a recovery routine. It closes all files, erases the target file as it exists so far, and requests that you insert a new disk in the target disk drive. The program will not proceed further until you press the Enter key, and it will stop if you press the Ctrl-Break combination instead. While this technique is not nearly as clever as BACKUP's trick of spanning files across disks, it will do just fine for most users who want to make incremental backups.

If, at the end of everything, BACopy finds out it didn't modify or create any target files, it tells you there was nothing to backup. That message will only appear if all source files exist on the target disk and directory and are the same dates or older than the target files.

I've been using BACopy on a daily basis for some time now, and have found it most helpful. It's a fraction of a second slower per file than COPY when you're running it for one file, but it saves so much time as you update your overall group of files that this slight performance penalty is well worth it. Most of the batch files I use to move about my Winchester disk and Bernoulli Box know how to run BACopy at appropriate moments. If a target disk isn't ready, PC-DOS tells you about it—BACopy doesn't have to worry.

Depending on which directory and disk I'm using, an ordinary floppy, the AT's high density floppy, or one of the Bernoulli Box disks is BACopy's target. All three work fine with BACopy, and the higher-density disks make it reasonable to have floppy disk directories to house your backups, a feature unsupported by the BACKUP command. ■

John Dickinson is a contributing editor of PC Magazine.

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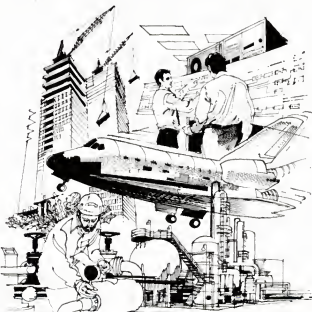
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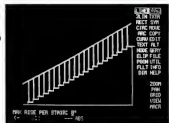
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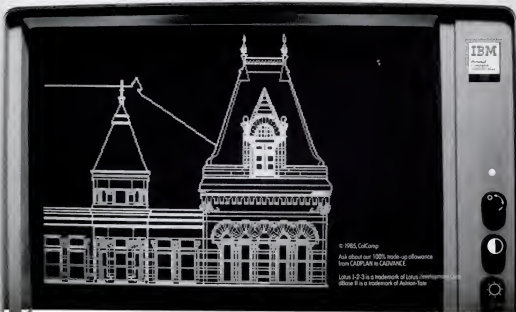
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Spreadsheet Clinic

This forum offers our readers an opportunity to exchange the quick fixes, simple solutions, and fancy footwork they've developed to make their spreadsheets work better.

Deriving the Day of the Week

In your column in the issue dated June 25, 1985 (PC, Volume 4 Number 13), you included a *Symphony* formula that uses the @CHOOSE function to determine the day of the week for a day entered with the @DATE function. Figure 1 is a macro I have written that will do the same thing in 1-2-3.

Column A is a series of dates using the @DATE function; column B shows the results of running the macro, and the macro itself is in column D. You would start the macro with column B blank and with the cursor in cell B2 (the cell to the right of the first date in the column).

The macro requires one named range, RSLT, which is cell F9. It is used for doing modulo arithmetic on the date numbers. In Figure 1, the value in RSLT is 0, which is the remainder of the last date tested: 17-Mar-84. The macro also creates and deletes a range named DATE, so don't use that range name elsewhere in the spreadsheet.

The macro will figure out the day of the week, write it in the cell next to each data, and stop automatically when it comes to the end of the DATE column.

John Hunt
Pleasant Hill, Pennsylvania

Before You Start Printing . . .

I recommend the command sequence in Figure 2 for the start of any print macro. It is designed to eliminate three common reasons for having to reprint a worksheet: (1) You forgot to recalculate the spreadsheet before printing. (2) You didn't enter the date when you booted the computer. (3)

You forgot to align the paper.

The macro requires that three cells be named. One, called TODAY, contains the formula @TODAY. Another, called JAN1,1980, contains @DATE(80,1,1), or whatever the default date happens to be on your computer. The third, which is called DUMMY, is nothing more than a dummy cell to complete the /xl commands in the macro.

In the second line of the macro, I have deliberately included a large number of spaces. They overflow the field limit and make the computer beep, thereby drawing attention to the error.

Alan Stein
Chicago, Illinois

This way of making an error message beep is especially clever, as is the check for the date. Since there is no way to set the system date from within 1-2-3, if you are caught in the IF-THEN statement of line 2,

the macro ends, and you have to exit to DOS and give the DATE command.

In Figure 2, the number to the right of TODAY (the result of @TODAY) is different from the number below it (the result of @DATE(80,1,1)) because the proper date was entered at boot-up.

Printing a Worksheet of Unknown Size

It's often handy to use a macro to set the print parameters of a worksheet, select the range, and do the printing. However, if you have changed the size of the worksheet since the time you wrote the macro, the print range specifications in your macro will no longer be correct.

I have written a macro that will print the entire worksheet even if you have added or subtracted lines. It uses the {end}{down} command to set the number of the lines in the print range. The following macro will work for a spreadsheet of any number of lines and of four columns:

	A	B	C	D	E	F	G
1	DATE	DAY					
2	84-Nov-83	FRI		{left}/rncDATE"			
3	84-Nov-82	THU		/xiDATE="0"/rncDATE"/xq			
4	14-Jan-83	FRI		{goto}RSLT			
5	13-Oct-85	SUN		{mod}(DATE,7)"			
6	25-Jun-85	TUE		{goto}DATE"(right)			
7	17-Mar-84	SAT		/xirslt=8"SAT"			
8				/xirslt=1"SUN"			
9				/xirslt=2"MON"			
10				/xirslt=3"TUE"			
11				/xirslt=4"WED"			
12				/xirslt=5"THU"			
13				/xirslt=6"FRI"			
14				/rncDATE"			
15				{down}/xq"D"			
16							
17							

Figure 1: A macro that derives the day of the week in Lotus's 1-2-3.

```
/PPR{home} . {end} {down} {right}
{right} {right} ~GO
```

Note that this macro will work only if there are no blank cells in column A, since the {end}{down} command will not necessarily take you to the last value in the column but only to the next blank cell.

George Koelsch
Greer, South Carolina

This macro is fine, but it won't help if you have changed the number of columns or have blank lines in column A.

The macro in Figure 3 is only a partial solution. It will print the spreadsheet only as far as the cell named END. You can fiddle with the worksheet size as long as you give this name to the cell just below the last data cell.

The macro will end up printing one blank line (because END is in a line below the data), but it will not print the contents of the cell END because the macro erases that cell before printing. After printing, the macro writes the word END into the cell just to remind you where it is.

This macro will work whether or not you delete columns and rows from within the worksheet. If you are adding cells, you have to remember either to give the range name END to the cell below the last one in your worksheet or to be sure to insert rows and columns in a way that does not disturb the cell already named END.

Cursor Movement à la WordStar

1-2-3 users often complain about having to switch between cursor movement and number entry when using the numeric keypad. I've seen various macro approaches to the problem, but one of the easiest solutions (as explained by Allan Schechet (Spreadsheet Clinic, PC, Volume 4 Number 7) is to use the shift key to switch back and forth between number entry and cursor movement.

However, if you use *WordStar*, the macro in Figure 4 lets you use word processing commands to move the cursor while you are in NumLock. Unlike *WordStar*, you use the Alt key rather than Ctrl. Also, I've assigned {Home} to the W key and {End} to the Z key, but otherwise the commands are just like *WordStar*'s.

If you save this macro as CUR-

```
{calc}
/xiToday=JAN1,1980/xLError=Date not set! "DUMMY"/xq
/xlAdjust paper then press [RETURN]"DUMMY"-
/pparPRINTRANGE"qppq
```

TODAY	31195
JAN1,1980	29221
DUMMY	

Figure 2: A macro that recalculates the spreadsheet, checks for the proper system date, reminds the user to adjust the printer, and prints the spreadsheet.

{goto}END~	Goto cell named END
/re~	Erase contents
/ppcr.[home]~	Clear print range, set new print range
gq	Go, Quit
"END"	Write END in last cell

Figure 3: A macro that prints the worksheet as far as the cell named END.

A	B
\A	{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}/RNLR~{DOWN}{DOWN}/RNLR~ {DOWN}{DOWN}/RNLR~{DOWN}{DOWN}/RNLR~{DOWN}{DOWN}/RNLR~ {DOWN}{DOWN}/RNLR~{DOWN}{DOWN}/RNLR~{DOWN}{DOWN}/RNLR~ {GOTO}\A~{LEFT}/RND\A~/RE{DOWN}{DOWN}{DOWN}{DOWN}{RIGHT}
\E	{UP}
\X	{DOWN}
\S	{LEFT}
\D	{RIGHT}
\R	{PgUp}
\C	{PgDn}
\W	{HOME}
\Z	{END}

Figure 4: A macro for WordStar-like cursor movements. The top portion "installs" it

SOR.WKS, you can read it into any current worksheet with the following command: /File Combine Copy Entire CURSOR <enter>. The \A portion of the macro is an installation program, that will assign the cursor movement macros to the proper keys. Activate it by putting the cursor in the cell with \A and typing /Range Name Labels Right <enter> <Alt>A. Note that the installation program erases itself after it has done its job.

Paul D. Simon
Bridgeport, Connecticut

I like the installation program better than the macro. For readers unfamiliar with the

/Range Name Labels routine, its purpose is to use labels in a column or row as range names for adjacent cells. Using this command to attach macro labels is clever.

However, in the installation section of the macro, rather than proceed down the column of macro labels, attaching each to its adjacent cell, it would be easier to attach the lot with one command. Thus, after the first five {down}s in the macro, you could replace most of the rest of it with:

```
/RNL{down}{down}{down}
{down}{down}{down}{down}
{down}{down}{down}{down}
{down}{down}{down}
```

The macro would be handier still if it were possible to make the installation program an autoexecuting macro that would run as soon as CURSOR.WKS was combined with your current file. However, the /File Combine command disables range names in the file that's read in from disk, so the installation macro will autoexecute only when you read it in with /File Retrieve.

Combining Worksheets

It's often necessary to take selected data from a worksheet on disk (let's call it DISK.WKS) and read it into the worksheet you are currently working on (SCREEN.WKS). If, when you last saved DISK.WKS, you knew exactly what data you would later need in SCREEN.WKS, you could have given that data a range name. Then you could use the /File Combine Copy Named-range command to read the data you need from DISK.WKS into SCREEN.WKS.

However, I often find that I may need data from DISK.WKS but haven't given that data a range name. In order to get that data, I have to (1) save SCREEN.WKS, (2) retrieve DISK.WKS and find the data, (3) give the data a range name, (4) save DISK.WKS, (5) retrieve SCREEN.WKS, and finally, (6) read the necessary data from DISK.WKS into SCREEN.WKS with /File Combine Copy Named-range.

I have found a quicker way, though the first two steps are the same: (1) Save SCREEN.WKS, (2) retrieve DISK.WKS and find the data, then (3) use /File Xtract Values to put this data in a temporary file, say, TEMP.WKS, (4) retrieve SCREEN.WKS, and finally, (5) read TEMP.WKS into SCREEN.WKS with /File Combine Copy Entire-file.

This saves time for two reasons. /File Combine will retrieve a small file much faster than it will retrieve a named range from a large file. Also, since you are not

giving DISK.WKS a new range name, you don't have to save it back to disk. Both these factors save a great deal of time.

Mike Miller
North East, Pennsylvania

Your new method is quicker. However, you give up one thing in return for speed: You haven't got a named range in DISK.WKS if you ever need the same data again. You should give your data range names to begin with so you never have to dump/reload the current file.

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Power User

Readers who wish to increase their productivity can use this forum to share their best hardware and applications software discoveries.

WordStar Patch Magic

Editor's note: While in future columns Power User will cover a wide variety of software and hardware, we've been saving up some of the following WordStar tips for several months. However, this isn't just a WordStar column, or any single-application column. Send us your shortcuts, discoveries, and advanced tricks on any PC or PC-compatible hardware products and nonspreadsheet software, and we'll pay you for your troubles. Be sure to include both a printout and a disk.

One reason WordStar 3.x is so popular is that it's so easily customized. Straight out of the carton it's a bit slow and hard to

a slightly higher degree of safety, but you can still wreak havoc if you obliterate your directory, or corrupt your File Allocation Table (FAT), or simply tear up a file, all of which are possible.

One reason the process is tricky is that DEBUG insists on working with hexadecimal addresses and values (this is where some commercial programs that allow decimal input may have the edge for some users). Another is that it's all too easy for an errant keystroke to write bad information atop good data.

The FIXWS.BAT batch file in Figure 1 simplifies the process by doing the dirty work for you. You still have to be extremely careful about the value(s), but FIXWS handles the actual patching. To guard against mistakes, the batch file checks to verify your patch and makes the actual change on a copy of WS.COM it names WSNEW.COM.

Note: Never patch your original WS.COM file! Work on copies only! Once you're absolutely satisfied the patched new WSNEW works properly, you can rename your old WS.COM to WSOLD.COM and your new WSNEW.COM back to WS.COM. To be perfectly safe, make a backup copy of WS.COM on a separate disk and put the backup away before you try this batch file or any other patching utility!

FIXWS works by creating a text script with all the keystrokes you'd normally type to make the changes, and then feeding those keystrokes into DEBUG. But, while it will handle the DEBUG syntax properly, it won't check for invalid addresses or values. Make sure all the numbers you enter are in hexadecimal notation (you may want to use a hexadecimal/decimal calculator, like the one in SideKick), and check them. You can't do any real harm, since FIXWS makes all its patches on a copy of

Customizing WordStar's interesting features means using a gut-level utility such as DEBUG.

use, and it's certainly not the easiest program to master overnight. However, once learned—and customized—it's awfully hard to beat for just about any word processing jobs.

The trick is to customize it properly. MicroPro's WINSTALL utility can make certain tasks (such as redefining function keys) fairly simple. However, WINSTALL is menu driven, which means it's ponderously slow. And it lets you customize only a small number of the available features.

Customizing most of WordStar's more interesting features means using a gut-level utility such as DEBUG.COM to change or "patch" the main WS.COM WordStar file. But playing with DEBUG is like playing with fire—if you're not careful, you can do all sorts of horrendous things to your files and disks. Plenty of commercial utilities can make the changes for you with

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```

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if %1x==z goto oops1
if %2x==z goto oops2
if exist debug.com goto start
echo =====
echo For this to work you need DEBUG.COM on your disk
echo or subdirectory, and it's not. Unless you are
echo PATHing to it, stop now by hitting Ctrl-Break
echo and then answering "Y" to the question onscreen.
echo Then copy DEBUG.COM from your DOS disk to this
echo disk, and start over. . . . H-O-W-E-V-E-R . . .
echo If you DO have a PATH to DEBUG, just continue.
echo =====
pause
:start
echo =====
echo This will put a new value of %2 at the WordStar
echo address %1. If this is what you want, continue.
echo If it's not, or if you're unsure, hit Ctrl-Break
echo and answer "Y" to the question onscreen!!!
echo =====
pause
COPY WS.COM WSNEW.COM
echo N WSNEW.COM > FW
echo L >> FW
echo E %1 %2 >> FW
echo W >> FW
echo Q >> FW
DEBUG < FW
DEL FW
echo =====
echo The new value %2 has now been inserted at WordStar
echo address %1. However, to be safe, this batchfile
echo made the changes in a COPY of your WordStar file
echo called WSNEW.COM. Try running WSNEW (by typing
echo WSNEW instead of the normal WS) to see if the new
echo value works. If it doesn't, ERASE WSNEW.COM and
echo then start over. Never, never, never change your
echo original WS.COM file!!! Work only on COPIES!!!
echo =====
goto end
:oops1
echo You forgot to specify a WordStar address
echo The proper format is:  FIXWS address newvalue
goto end
:oops2
echo You forgot to specify a new value
echo The proper format is:  FIXWS address newvalue
goto end
:end

```

Figure 1: *FIXWS.BAT* batchfile to automate patching your *WS.COM* WordStar file. The syntax is *FIXWS* address newvalue, where both the address and the new value to be inserted at that address are in hexadecimal notation. For instance, to toggle the ruler line at the top of the screen permanently off, type *FIXWS 38B0* and hit Enter (or to toggle it on, *FIXWS 38BFF*). Note that this will make all changes on a copy of your *WS.COM* file called *WSNEW.COM*. Try the change by running *WSNEW* rather than *WS*. Never change your original *WS.COM* file. Work on copies only. Once you're absolutely satisfied the patched new *WSNEW* works properly, you can rename your old *WS.COM* to *WSOLD.COM* and your new *WSNEW.COM* back to *WS.COM*—or you can adapt the batch file to do this for you automatically. To be perfectly safe, make a backup copy of *WS.COM* on a separate disk, and put the backup away before you try this *FIXWS* batch file.

WS.COM, but do be careful. The syntax for using it is

FIXWS address newvalue

PC Magazine and many other periodicals and books have published tables of patches and addresses. Some patches are toggles; for instance, if the value at *DEBUG* address &h38b is FF, you'll see the ruler line (OT) at the top of the screen whenever you turn WordStar on. If the value at &h38b is 0, WordStar will turn the ruler line off. Some patches hold level values. The state of the help level (JH) is kept at address &h360. If you plug a 0 into &h360, no help screens will appear. If you plug a 3 into address &h360, you'll get maximum help.

FIXWS also lets you enter text. Specify the hexadecimal address the normal way, but rather than entering a single hex value, enter new text inside quotation marks. Be extremely careful with this, however, since new text can't be longer than existing text and must be padded with spaces (hex 20s) if it's shorter than what's already there. Still, *FIXWS* makes patching my favorite program easy.—Paul Somerson

Fast File Insurance

I've said it before, and I'll say it again: if you're not running *WordStar* from a RAMdisk, you're wasting time, especially with floppies. Putting *WordStar*'s files on a RAMdisk speeds things up amazingly; just be sure you've patched *WS.COM* so it considers your RAM its default drive. The byte at 2DC controls this: A value of 01 translates to drive A; 02 to B; and so on. Using *DEBUG* is the fastest way to make the change; for 3.3 and later editions, *WINSTALL* also works.

Things go even faster if you put your working files on the RAM drive, too. There's just one problem: Saving them to the permanency of a fixed or floppy disk. I've outlined the simplest way here before, but I've added some DOS 2.0 improvements. Let's still call it *W.BAT* (see Figure 2).

The version here assumes you have it, all your *WordStar* files and your working file on a RAM drive called C:, and you want to save your files to a floppy drive B:. To create it, use the N (for Non-document mode) of *WordStar*.

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To invoke it, simply type **W FILE-NAME**. You'll be whisked into *WordStar*, where you can work on **FILENAME** to your heart's content. To save the file, use **Ctrl-KX**. Strike a key at the message to copy the file from RAMdisk to real disk, and next thing you know, you'll find yourself back at the beginning of it in *WordStar*. You can do this as often as you like. To get back to DOS, just follow the instructions on the screen.

This version protects you from opening a new file with the same name as the one on the floppy disk and overwriting the existing file with the new one. The message about what to do to copy the file is mostly for novices; once you've got the hang of things, you can dispense with it to speed things up a little. You might want to keep the first two lines, though. Remember: **W.BAT** can copy only the file you named when you first invoked it. If you switch to other files before you exit *WordStar*, you

```
cls
echo off
cls
if not exist b:tl goto loop
if exist c:tl goto loop
cls
echo A FILE WITH THAT NAME EXISTS ON YOUR REAL (NOT RAM) DISK.
echo To copy it to your RAM disk and continue,
pause
copy b:tl c:
:loop
cls
echo You may now copy your last edit of
echo      tl
echo to REAL (not RAM) disk safely.
echo      *****
echo To AVOID doing this, hit Ctrl-Break.
echo Then answer Y when asked "Terminate Batch Job (Y/N)?"
echo
echo To COPY this file and return to it,
pause
copy c:tl b:
goto loop
```

Figure 2: **W.BAT** batch file that automates running *WordStar* from a RAMdisk and ensures against inadvertently writing over an existing file.

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CIRCLE 107 ON READER SERVICE CARD

may get confused about what you're really sending to safety; the message tells you precisely.

Stephen Manes
Riverdale, New York

Running WordStar on a RAMdisk (especially on a 6 or 8 MHz machine) is the single best trick for increasing your efficiency. And this batch file takes away all the fears many users have about using RAM-disks. However, one caveat: watch what you're doing when quitting one file and starting another. Mr. Manes's batch file includes plenty of checks and warning messages to make sure you don't write over an existing file, but be careful out there.

Substitute for WordStar?

Finally, with PC-DOS 3.1, IBM has provided a program that will delight WordStar users with hard disks. Now, instead of

having to keep the WordStar program and overlay files in every subdirectory that contains text files, you need just one copy of WordStar and can use it in whatever subdirectory you'd like.

The new PC-DOS 3.1 program that makes this possible is called SUBST, short for "substitute." SUBST allows you to define a new drive letter that is actually an alias for a subdirectory on an existing drive.

It's simple to use the SUBST program with WordStar. (While this explanation will assume you have a standard PC-XT with a hard disk as drive C: and no RAM disk installed, the same principles will apply even if your system has additional units, such as a tape backup).

First, you put the WordStar program and your overlay files (WS.COM, WSMSEG.OVR, and WSOVLY1.OVR) in their own subdirectory, \WORDSTAR, for instance.

Second, run the WordStar installation program to specify the "system drive" as drive D:. You could do this in DEBUG also by just sticking a 04 in offset &h02DC of WS.COM. You don't have a drive D: yet, but SUBST will provide one.

DOS 3.1's SUBST program
allows you to define a
new drive letter that is
actually an alias for a
subdirectory.

Third, add the following statement to your AUTOEXEC.BAT file:

SUBST D: C:\WORDSTAR

This statement will "create" a new drive D:, which will actually refer to the WORDSTAR subdirectory on your drive C: hard disk.

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And that's it. When you're in any subdirectory, all you need do to call up *WordStar* is

D: WS

Because we've set the *WordStar* system drive as D:, *WordStar* will search that drive for its overlay files. But DOS will actually use the \WORDSTAR subdirectory. You don't even need the D: drive specification when you call up *WordStar* if you add a "D:" onto your existing PATH command.

Although you might think that the SUBST program remains resident in memory to perform this conversion, it doesn't. PC-DOS already has memory set aside for this drive substitution, so using the SUBST program will not take up any extra memory.

Now you need only keep *WordStar* in one subdirectory, but you still can't change subdirectories without leaving *WordStar*. Or can you? Again SUBST comes to the rescue. Let's say you use *WordStar* in three subdirectories called LETTERS, MEMOS, and DIARY. You can create three more alias drives for these three subdirectories by the commands

SUBST E: C:\LETTERS

SUBST F: C:\MEMOS

SUBST G: C:\DIARY

which can also go into your AUTOEXEC.BAT file. How do you get from one to the other within *WordStar*? Just change the logged disk drive from the main menu. But before you use the SUBST program for any drive above drive E:, you have to do one more thing.

I mentioned above that PC-DOS already has reserved memory for these disk drive substitutions, but that's only through drive E:. If you want to use alias drives above E:, you'll have to add a line to your existing CONFIG.SYS file (or create a CONFIG.SYS file if you don't already have one). This line is

LASTDRIVE=G

Then, the next time you boot up, PC-DOS will reserve space for F: and G: drive substitution as well. This LASTDRIVE specification was included in PC-DOS 3.0 where it seemed to have no purpose and confused a lot of people, including me.

But with the SUBST program, it all becomes clear. You can actually go all the way up to LASTDRIVE=Z, but each additional drive above E: takes up 81 bytes of memory.

Although the procedures above deal only with *WordStar*, SUBST can actually help out with many other programs that do not recognize subdirectories but do allow specifying different disk drives. To any program running under PC-DOS (except some "disk doctor" programs), these phony disk drives appear to be real drives.

SUBST is a valuable addition to PC-DOS and probably alone worth the cost of upgrading to Version 3.1.

Charles Petzold
New York, New York

Finally is right! It's about time DOS recognized that users want to access files in any subdirectory from any other subdirectory. Some commercial utilities (Filepath, Easypath, even IBM's own File Facility, and many others) already allow this; I've used Filepath for months, and it's worked flawlessly. The commercial packages are far easier to use, but the SUBST trick works too.

If you're going to try this, it's far easier to use DEBUG to patch the system drive byte than to wrestle with MicroPro's menu-driven WINSTALL. Get into DOS and type

DEBUG WS.COM

and then when you see the DEBUG "..." prompt, type

E 2DC 4

and finally type W and then type O (The 4 specifies drive D:). Hit the Enter key at the end of each of the four lines.

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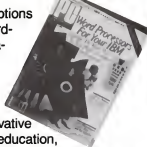
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User-to-User

PC readers use this forum to help one another by passing along their solutions, comments, and complaints.

Last issue, *User-to-User* led off with a utility called BATMAKER.BAS that created a long list of one-line batch files that let hard disk users switch between subdirectories without having to type in backslashes and long pathnames. The DIRMAK.BAS utility in Figure 1 creates a master index (called MASTER.DIR) of all the subdirectories users can switch to.

Before running DIRMAK, get into DOS and type:

```
chkdsk /v | find "Dir" > tempfile
```

The program will strip out the extraneous

paths, alphabetize the subdirectory names, and create a file with the names spaced out evenly across the screen. The bubble sort routine in lines 280 to 300 is IBM's, and it's painfully slow. However, it takes up only three lines of BASIC; substitute your own if you like. (Note: This was designed for subdirectory names that don't have periods and extensions. Most don't.)

After running the program, create a small batch file called DIRM.BAT that contains the one line:

```
type master.dir | more
```

and put DIRM.BAT in a subdirectory you

```
100 'DIRMAK.BAS -- by PC Magazine --
110 'This creates a master table of subdirectories.
120 'Before you use this, get into DOS and type:
130 '
140 '   chkdsk /v | find "Dir" > tempfile
150 '
160 'Note: DON'T CHANGE THE LINE NUMBERS!!
170 DIM S$(200):G$=CHR$(32)+STRING$(18,61)
180 ON ERROR GOTO 360
190 OPEN "tempfile" FOR INPUT AS #1
200 OPEN "master.dir" FOR OUTPUT AS #2
210 PRINT #2,G$;" MASTER LIST OF SUBDIRECTORIES ";DATE$;G$
220 IF EOF(1) THEN 280 ELSE LINE INPUT #1,A$
230 A$=RIGHT$(A$,LEN(A$)-12):IF A$="" THEN 220
240 FOR A=LEN(A$) TO 1 STEP -1
250 IF MID$(A$,A,1)<>"\" THEN 270
260 S$(K)=RIGHT$(A$,LEN(A$)-A):K=K+1:GOTO 220
270 NEXT
280 FLIPS=1:WHILE FLIPS:FLIPS=0:FOR I=0 TO K-2
290 IF S$(I)>S$(I+1) THEN SWAP S$(I),S$(I+1):FLIPS=1
300 NEXT:I=K:PRINT #2,CHR$(32)
310 FOR A=0 TO K STEP 6
320 PRINT #2,TAB(3);S$(A);TAB(16);S$(A+1);TAB(29);S$(A+2);
330 PRINT #2,TAB(42);S$(A+3);TAB(55);S$(A+4);TAB(68);S$(A+5)
340 NEXT
350 CLOSE:KILL "tempfile":END
360 IF ERR=53 THEN LIST 120-140 ELSE ON ERROR GOTO 0
370 CLOSE:END
```

Figure 1: DIRMAK.BAS program that creates a file called MASTER.DIR containing a sorted list of your hard disk's subdirectories. To use the MASTER.DIR file, create a batch file called DIRM.BAT that contains the line TYPE MASTER.DIR | MORE and put both MASTER.DIR and DIRM.BAT in a subdirectory you PATH to. (Note: This was designed for subdirectories that don't use periods and extensions.) If there are more than 200 subdirectories on your disk, change the DIM S\$(200) statement in line 170. And be sure not to change the line numbers in DIRMAK!

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USER-TO-USER

PATH to. Then, for an index of your sub-directories, just get into DOS and type DIRM. By using this and the many batch files created by BATMAKER, you can see exactly what subdirectories are on your disk and switch to them effortlessly. If you have more than 200 subdirectories on your disk, change the DIM SS(200) statement in line 170—and be sure not to change the program's line numbers.

No Comment

One of the most irritating things about DOS is its inability to tell you more about what a file contains that can be deciphered from the 11 characters of the filename. Using standard extensions such as .TXT for

textfiles, .LTR for letters, .DOC for document files, etc., can help, but this leaves a scant eight characters to describe the file's contents. It would be very handy if the directory listing included a field after the date and time that let the user write a short description of what was inside each file.

While half a dozen software vendors sell DOS front-end packages that provide such comment fields, it's fairly simple to create a poor-man's version of this utility in BASIC. Before running the COMMENTR.BAS program in Figure 2, get into DOS and type:

DIR > DIRFILE

to create a file containing a listing of all the

```
100 'COMMENTR.BAS -- by PC Magazine -- creates directory comment filee
110 'Before you use this, get into DOS and type:
120 '
130 '   dir > dirfile
140 '
150 'Note: DON'T CHANGE the program's line numbers!
160 ON ERROR GOTO 500
170 SCREEN 8:WIDTH 80:KEY OFF:COLOR 3,0,0:LOCATE ,,0:CLS:SS=STRING$(80,61)
180 '
190 ' *** read in directory and capture filenames only ***
200 '
210 OPEN "dirfile" FOR INPUT AS #1
220 ON ERROR GOTO 500
230 IF EOF(1) THEN GOTO 600 ELSE LINE INPUT #1,AS
240 IF FLAG AND LEFT$(AS,1)=CHR$(32) THEN GOTO 600
250 IF LEFT$(AS,2)="-" THEN FLAG=-1:GOTO 230
260 IF NOT FLAG OR MID$(AS,18,3)=".BAT" OR LEFT$(AS,7)=".DIRFILE" THEN 230
270 FOR I=1 TO 8:IF MID$(LEFT$(AS,8),I,1)=CHR$(32) THEN 230
280 NEXT
290 MS=LEFT$(AS,A-1):MS=MS+ "."+MID$(AS,18,3)
300 '
310 ' *** clean end print beginning of file ***
320 '
330 IF MID$(AS,14,1)<>"C" THEN 360 ELSE PRINT "**** Note: ";
340 IF MID$(AS,18,3) <> STRING$(3,32) THEN MS=MS+ "."+MID$(AS,18,3) ELSE MS
350 PRINT MS;" is a subdirectory..."GOTO 480
360 PRINT "Want to see first few lines of "MS;TAB(46); " (Y/N)? "
370 IS=INKEY$:IF IS="" THEN 370
380 IF IS<>"Y" AND IS<>"N" THEN 480 ELSE PRINT $;
390 OPEN MS FOR INPUT AS #2
400 FOR A=1 TO 5:IF EOF(2) THEN 440 ELSE LINE INPUT #2,B$
410 FOR C=1 TO LEN(B$):D=ASC(MID$(B$,C,1)) AND 127
420 IF D>31 THEN PRINT CHR$(D);
430 NEXT B$
440 PRINT $;:CLOSE #2
450 '
460 ' *** create filee ***
470 '
480 PRINT "Want to create comment file for "MS;TAB(46); " (Y/N)? "
490 IS=INKEY$:IF IS="" THEN 490
500 IF IS<>"Y" AND IS<>"N" THEN PRINT:GOTO 230
510 MS=MS+ ".BAT":FILES MS
520 PRINT:PRINT:PRINT TAB(4); "**** NOTE!! -- ";
530 PRINT MS+ ".BAT already exists -- can't overwrite it ****":PRINT:GOTO 230
540 PRINT "On the line below, enter up to 74 characters describing "MS
550 LINE INPUT "*****";FS:OPEN MS+ ".BAT" FOR OUTPUT AS #2
560 PRINT #2,"<CR>OFF":PRINT #2,"<CR>"<CR>LEFT$(FS,75):CLOSE #2
570 PRINT MS+ ".BAT comment batch file created..."PRINT:GOTO 230
580 IF ERR=53 THEN CLOSE:GOTO 110-130
590 IF ERR=53 THEN RESUME 540
600 CLOSE:KILL "dirfile"."END"
```

Figure 2: Program to create batch files that let you identify the contents of all your files. Before running this, get into DOS and type: DIR > DIRFILE and be sure to create COMMENTR.BAS exactly as shown; don't change the program's line numbers. When you're done, get into DOS and type any program's filename (without the extension) to view the comments you've written.

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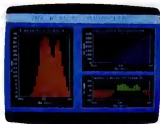
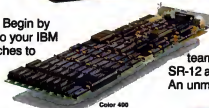
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CIRCLE 219 ON READER SERVICE CARD

individual files on your directory.

COMMENTR.BAS lets you view the first few lines of each file and asks whether you want to create a comment file. The program ANDs each character with 127 to strip the high bits of WordStar files and ignores all the control characters (with ASCII values below 32) that would disrupt the viewing process. Finally, it identifies sub-directories, which are really just files handled a special way. And since it creates batch files with .BAT extensions, it first checks to see that it doesn't overwrite an existing batch file with the same name.

Once you've run the program, get into DOS and type any filename or subdirectory name (without its normal extension, of course, since the program automatically tacks on a .BAT), and DOS will display a one-line comment telling you what's inside. Be sure to RENAME .BAT files created for .COM or .EXE files that you add comments to.

```
100 ' POKECAPS -- TYPE EXACTLY AS SHOWN!!
110 KEY 9,CHR$(27)+CHR$(12)+"LIST"+CHR$(13)
120 KEY 10,"RUN 140"+CHR$(13)
130 CLS:PRINT "NOW HIT <F9> THEN <F10>":END
140 DEF SEG=&HB800
150 FOR B=0 TO 2402 STEP 2
160 POKE B,PEEK(B) OR 32
170 NEXT
180 PRINT:PRINT "Hit any key to change back"
190 IF INKEY$="" THEN 190
200 DEF SEG=&HB800
210 FOR B=0 TO 2402 STEP 2
220 IF PEEK(B)>64 THEN POKE B,PEEK(B) AND 95
230 NEXT
```

Figure 3: Program that demonstrates a fast way to switch between uppercase and lowercase text by POKEing to memory. Note: For mono systems, change lines 140 and 200 to: DEF SEG=&HB000, and be sure to type the listing exactly as shown.

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A Capital Idea

Since the PC family stores a replica of the text screen in memory, it's fairly simple to perform some fast, attention-getting tricks by manipulating memory directly. The text screen memory map alternately stores all the ASCII values of the characters displayed (at locations 0, 2, 4, etc.) and each character's attribute—its foreground and background colors and whether or not it's blinking—at locations 1, 3, 5, etc.).

The program in Figure 3 will list itself, change all the uppercase letters to lowercase ones, then change them back, by manipulating the character byte (the even-numbered byte). You can adapt the program to manipulate the attribute byte by changing lines 150 and 210 to read:

```
FOR B=1 TO 240 STEP 2
```

Then change the last number in line 160 from 32 to 128, and the last number in line

```
100 'REVERSE.BAS -- by Jack Graham
110 SCREEN 1,0:COLOR 9,0:CLS:KEY OFF:DIM R0(2000):K=9:J=8:Q6=CHR$(34)
120 LOCATE 10,4:PRINT "Hit 'Q6','A','Q5' for automatic flipping, or"
130 LOCATE 12,4:PRINT "any other key for manual operation;"
140 IF INKEY$="Q6" THEN 140 ELSE IF INKEY$="A" THEN 150
150 LINE (0,0)-(319,199),3,BF:GET (0,0)-(319,199),R0:CLS
160 LINE (0,0)-(100,70),2,BF:LINE (15,50)-(239,190),3,BF
170 LINE (75,15)-(190,80),3,BF:LINE (85,25)-(100,90),2,BF
180 CIRCLE (245,60),80,3,,,0:PAINT(245,20),3
190 CIRCLE (225,120),60,2,,,4:PAINT(225,120),2
200 CIRCLE (125,160),130,2,,,12:PAINT(125,160),2
210 CIRCLE (125,160),130,3,,,12:LINE (235,135)-(290,105),1,BF
220 CIRCLE (45,30),20,3:LINE(0,0)-(319,199),0,BF:LINE(1,1)-(310,190),0,B
230 LINE(2,2)-(317,197),0,BF:LINE(3,3)-(316,196),3,B
240 LINE(4,4)-(315,195),0,BF:LINE(5,5)-(314,194),3,B
250 ON KEY(1) GOSUB 300:KEY(1) ON:ON KEY(2) GOSUB 350:KEY(2) ON
260 ON KEY(3) GOSUB 360:KEY(3) ON:ON KEY(18) GOSUB 370:KEY(18) ON
270 LINE(48,64)-(200,120),0,BF:LINE(49,65)-(279,127),3,B
280 LINE(51,67)-(277,125),2,B
290 LOCATE 10,8:PRINT "=== Screen Reverse Demo ==="
300 IF INKEY$="A" THEN LOCATE 12,8:PRINT "F1-Reverse the Screen"
310 LOCATE 13,8:PRINT "F2-Change Background Color"
320 LOCATE 14,8:PRINT "F3-Change Palette Color"
330 LOCATE 15,8:PRINT "F18-End the Demonstration"
340 IF INKEY$="A" THEN GOSUB 380:GOTO 340 ELSE 340
350 K=(K+1) MOD 16:COLOR K,J:RETURN
360 J=(J+1) MOD 2:COLOR K,J:RETURN
370 CLS:END
380 PUT(0,0),R0,XOR:RETURN
```

Figure 4: Program that demonstrates fast color reversal. Hitting "A" at the beginning of the program will trigger rapid automatic color switching for a movie marquee-type effect.

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The Norton Utilities are practical disk management tools, too. I use The Utilities daily to find files, track down data and put disks in order. No more misplaced data, I'm organized! And with UnErase,

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CIRCLE 346 ON READER SERVICE CARD

USER-TO-USER

220 from 95 to 127, and the entire program listing will blink and then unblink. By experimenting with these numbers on a color monitor, you can produce all sorts of eye-popping color changes.

POKECAPS.BAS is written to run on a color system; for mono screens, change lines 140 and 200 to:

```
DEF SEG=&HB0000
```

—and be sure to type the listing exactly as shown.

Graphics Color Switcher

A recent User-to-User column (PC Magazine Volume 4 Number 12) contained a trick I submitted for reversing the colors of graphics images. I later realized that the process can be speeded up enormously by GETting the entire screen and PUTting it back at location (0,0) using the

A trick for reversing the colors of graphics images can be speeded up enormously by using the XOR option.

XOR option. The REVERSER.BAS demonstration program in Figure 4 will reverse the screen image in about one second in either interpreted or compiled BASIC. The only disadvantage of this method is that the storage array takes up 16,000 bytes of memory.

Jack Grasham
Portland, Oregon

This is an attention-getting trick. By repeatedly XORing the image, you can create a very interesting movie marquee effect. We adapted the program slightly to show this; hit "A" as soon as the program starts to see it.

Share Your Discoveries

Tell the world about your latest discovery through User-to-User, and we'll pay you \$50, plus an extra \$25 if you submit it on a disk. If you send a disk, please include a printout to ensure against damage in transit. Mail your contributions to: User-to-User, PC Magazine, One Park Avenue, New York, NY 10016. ■

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New on the Market

The MERCHANDISER

Independent retailers now have a new tool called *The MERCHANDISER* that integrates point-of-sales, inventory control, and customer mailing list management functions within a single applications program. The software can handle an in-

published profit margins.

The MERCHANDISER can calculate sales taxes, salesperson commissions, and profit/loss analyses. Mailing lists are automatically generated and updated without duplication each time sales are transacted and can be sorted and used for selective direct mail campaigns according to user-defined criteria codes.

List Price: \$595

Requires: 128K RAM, two disk drives, PC-DOS.

U.S. Digital Corp.
5687-H S.E. Internat'l Way
Portland, OR 97222
(503) 654-0668
Telex: 88-9521

Circle 671 On Reader Service Card

PEAK PERFORMANCE:RUN

Running enthusiasts might find *PEAK PERFORMANCE:RUN* software helpful in scheduling personal training efficiently with less chance of injury. The user keeps a daily log of such data as top times and peak runs. From this data, the program develops daily physiological feedback tailored to the individual's performance levels.

List Price: \$70

Requires: 64K, one disk drive, PC-DOS.

PEAK PERFORMANCE
Box 60681
Palo Alto, CA 94306
(415) 424-0208

Circle 680 On Reader Service Card

Life/Time Manager

Life/Time Manager by Psychometric Software is a program for users who want to make better use of their time. Based on techniques developed by a psychologist, the software consists of three elements that help a person to establish personal goals, identify activities to reach these goals, and schedule time to accomplish the activities.

The goals section of the program uses problem-solving methods to help an individual develop short- and long-term goals that aid the user in refining his or her own objectives.

The program's activities section assists the user in locating those activities most likely to help in achieving the pinpointed goals. The last step here is to develop a "To Do" list of these

goal-related activities.

The scheduling section assists the user in finding time to perform the activities outlined in the previous section. The user identifies the hours he or she tends to work best during a 24-hour period. The user also identifies the time free from commitments to other tasks. This section questions the user about a given activity, then displays the best hours in which to perform the defined activity. This section can also develop and print daily work schedules.

List Price: \$49.95

Requires: 128K RAM, one disk drive, PC-DOS.

Psychometric Software, Inc.
1304 E. New Haven Ave.
Melbourne, FL 32901
(305) 768-0763

Circle 679 On Reader Service Card



ventory database of up to 65,000 separate items, automatically updating the database and printing a receipt/invoice with each customer or supplier transaction entered. It also provides immediate access to daily sales profit reports, suggested reorder lists, purchasing and sales history by product or salesperson, and several other reports.

The program is compatible with both *dBASE II* and *Lotus's 1-2-3* software, permitting extended manipulation of sales/inventory data. The menu-driven program also offers such data entry safeguards as a warning prompt should a salesperson enter a sales price below pre-



Life/Time Manager, Psychometric Software, Inc.

New on the Market Submissions Guide

Owing to the high volume of new product materials received each week at PC, all submissions to New on the Market should follow these guidelines:

1. Include the retail price and details of both hardware and software needed for an end-user to properly use your new product. This includes required amount of RAM, number and type of drives, operating systems supported, and peripheral equipment needed.
2. Releases should be typewritten double-spaced on one side of the paper. Copies of advertisements may be included, but in most instances we need more information than is typically included in an ad. Include telephone contacts for marketing and technical questions.
3. If available, include black & white glossy photos of the product, 4 x 5 inches or larger.

New on the Market does not review products; do not send sample or demo copies of software. All product announcements are run on a space-available basis, at the exclusive discretion of the editor. Please note that it is impossible to guarantee publication of a product announcement for any particular issue.

CDS 2300 Laser Printer

The CDS 2300 Laser Printer from Corporate Data Sciences can produce a full page of high-resolution graphics images at one time, in contrast to other similarly priced laser printers that produce only one small section of a graphics image at one time.

The printer's controller uses its own 80186 microprocessor to handle printing tasks. The 80186 is augmented by 1.28 megabytes of RAM for bit-mapped graphics, 128K of system RAM, and 128K of system ROM built into the printer.

Offered with both RS-232 serial and Centronics parallel ports, the CDS 2300 has four principal operating modes: Diablo 630, Tektronix 4014, ANSI X3.64, and full bit-mapped image mode.

The system can print at rates of eight pages per minute, in a range of type fonts that include letter-quality, bold, and italics in 10-point size. Characters can be single-spaced, proportionally spaced, or independently positioned on the page.

List Price: \$5,695

Corporate Data Sciences, Inc.
2560 Mission College Blvd.
Santa Clara, CA 95054
(408) 980-9474

Circle 681 On Reader Service Card

SongWright III

This latest version of the PC-based music processor now offers a range of extended features that make it a complete tool for the serious musician. Along with a full-screen graphics editor that displays and plays music while it is written, the program can now also print music with connected eighth and sixteenth notes. Also, the user may now add custom sets of musical symbols and notation to those incorporated in the program.

SongWright III features bass and treble clefs, all time signatures, multiple staves and voices, harmony, and counterpoint. It can automatically transpose compositions into any desired key and includes the ability to integrate text with music for lyrics, dynamics, and chord notations.

List Price: \$49.95

Requires: 128K RAM (192K on the PCjr), one disk drive, PC-DOS, Epson printer.

SongWright
928 Fillmore St., #101
Denver, CO 80206
(303) 321-0481

Circle 678 On Reader Service Card

Story Line

Story Line from Scholastic Software is a "story processor" that lets children create and edit their



SongWright III, SongWright

own interactive stories. The program is compatible with the IBM PCjr; versions of *Story Line* are available for single-user and classroom use.

List Price: Single-user version, \$39.95; classroom version, \$59.95

Requires: 64K RAM, one disk drive, PC-DOS 2.1.

Scholastic Software
730 Broadway
New York, NY 10003
(212) 505-3410

Circle 676 On Reader Service Card

Hard Disk Management

Global Technologies is offering the *Hard Disk Management System (HDMS)*, a menu selection system for accessing up to 15 separate applications pro-

grams and up to six DOS commands (internal or external) from a single user-designed menu screen. Each application listed on a menu can be installed with separate printer configurations, drive assignments, and DOS directories.

HDMS can also be installed in each volume you have on your hard disk, permitting up to 15 applications to be accessed by menu for each volume. Features of the software include windowed help screens, directory listings screens, and a system of default parameters that can be reconfigured easily as needed.

List Price: \$95

Requires: 128K RAM, hard disk, PC-DOS.

Global Technologies
16572 E. Louisiana Dr.
Aurora, CO 80017
(303) 337-7758

Circle 675 On Reader Service Card



CDS 2300 Laser Printer, Corporate Data Systems, Inc.

PC77/78 and PC73/78

Users wishing to link their PCs with Honeywell mainframe systems have been given two new software tools by Cambridge Computer Corp. *PC77/78* allows the user's PC to emulate a range of Honeywell VIP7700 and VIP7800 series synchronous terminals. The *PC73/78* program allows the PC to emulate the Honeywell VIP7200, VIP7300, and VIP7800 asynchronous terminals.

PC77/78 provides access to the host Honeywell system though the use of multiple windows on the display screen. In addition, the software lets the user temporarily exit the program to execute a DOS command or application, or to print data while simultaneously communicating with the host system. *PC73/78* includes the features listed above, as well as three file transfer methods: Kermit, Xmodem, and protocol. These asynchronous protocols aid in reducing errors during PC-host data transfers.

Both programs emulate Honeywell terminals without host system or applications software modifications, regardless of the mainframe's operating system. The 8087/80287 math coprocessor is used if present, and the link to the mainframe system can be made via modem or multiple interface unit.

List Price: *PC73/78*, \$395; *PC-*

77/78, \$795

Requires: Either program: 256K RAM, one disk drive, PC-DOS. *PC73/78*: asynchronous adapter. *PC77/78*: bisynchronous adapter.

Cambridge Computer Corp.
151 Bender Rd.
Mt. Carmel, CT 06518
(203) 288-6004

Circle 666 On Reader Service Card

SALESEYE

High Caliber Systems has released a series of salespersons' productivity tools under the common name of **SALESEYE**. Specific versions of the program are available for insurance agents, securities brokers, and bank calling officers, as well as a generic version suitable for use by any salesperson with corporate accounts to manage. The multi-function software is designed to help individual salespeople qualify potential buyers, focus their efforts on accounts with highest sales, analyze their own performance, and manage their professional time effectively.

SALESEYE combines a database manager, a full-featured word processor, and a time manager into an integrated menu-driven system. It can store, retrieve, and print data on thousands of prospects or clients. The data can be used by the word processing component to produce customized letters,



reQuest, System Automation Software, Inc.

by the time scheduler to manage appointments, and by the analysis component to analyze past and expected sales performance. Nine data fields can be customized by the user.

Available options for **SALESEYE** include an automated phone dialer that requires a Hayes-compatible modem. Users receive a 90-page tutorial manual, a 160-page reference manual, unlimited phone support, and free upgrades.

List Price: \$89; *Autodial* \$50

Requires: 192K RAM (256K with *Autodial* option), two disk drives, PC-DOS 2.x.

High Caliber Systems, Inc.
165 Madison Ave.
New York, NY 10016
(212) 684-5553

Circle 670 On Reader Service Card

reQuest

System Automation, Inc. is offering a new database management system called **reQuest**. The program is a relational DBMS with transaction processing and statistical capabilities, available in single-user and multiuser (LAN) versions. Based upon a program originally designed for mainframe use, it is menu-driven, with all commands in plain English. The multiuser version of **reQuest** is

compatible with 3Com's EtherNet, Orchid's PC-Net, Novell's Netware, IBM's Network system, and other LANs.

Applications created under the **reQuest** software can have as many as seven data files open simultaneously, with up to 65,000 records per data file. Each data file can contain as many as 2,048 fields (limited to a 2,048-byte per record maximum).

The program offers eight data types, six statistical data types, and a computational accuracy of ten digits. A built-in query language allows the advanced user to automate commands and procedures in creating custom applications.

The **reQuest** software is available from System Automation Software on a 14-day trial basis. This marketing program, known as Soft-Loan, provides a complete working package free of charge for evaluation, with phone support.

List Price: Single-user version, \$695; LAN version, \$1,400

Requires: 384K RAM, one disk drive, PC-DOS 2.x

System Automation Software, Inc.

8555 Sixteenth St.
Silver Spring, MD 20910
(800) 321-DBMS

Circle 669 On Reader Service Card



SALESEYE, High Caliber Systems, Inc.

Signalman Modem Add-Ons

Anchor Automation has announced two new standalone devices designed to enhance modem communications. The Signalman Error-Free and the Signalman Computer Mailbox can both be used by existing 300/1,200 bps modem installations, providing extended functions without modifications to current hardware or software.

transfers, where data is transferred character-by-character. It can be used with 300 or 1,200 bps modems.

List Price: Computer Mailbox, \$299; Error-Free, \$199

Requires: Both devices: Asynchronous adapter, modem.

Anchor Automation, Inc.

6923 Valjean Ave.

Van Nuys, CA 91406

(818) 997-7758

Circle 667 On Reader Service Card

at his or her own pace. At given points, the user can skip lessons, repeat sections, or even flip the tape over to reach more-advanced sections. The course can be operated on any cassette player.

List Price: \$75

FlipTrack Learning System

526 N. Main St.

Glen Ellyn, IL 60137

(312) 790-1117

Circle 677 On Reader Service Card

Electra-Find

Electra-Find from O'Neill Software is a DOS Find enhancement that can perform Boolean, wildcard, exclusion, and phonetic searches of all files kept on a hard or floppy disk. The utility can retrieve data of any type or length. It will also tell you the filename and location of each item and can save the data to a new file or append it to an existing one.

Electra-Find can run in either a command or menu mode. It can search through ASCII files, word processing documents, or binary files.

List Price: \$65

Requires: PC-DOS 2.x: 64K RAM; PC-DOS 3.0: 96K RAM; one disk drive.

O'Neill Software

Box 26111

San Francisco, CA 94126

(415) 398-2255

Circle 672 On Reader Service Card



Signalman Error-Free, Signalman Computer Mailbox, Anchor Automation, Inc.

The Signalman Computer Mailbox is a modem message center with a 64K memory buffer that permits the user to receive incoming electronic mail messages even if the user's PC is off-line. It also provides remote access and message retrieval with multiple-level password protection.

Three passwords ensure data security. Password #1 allows a caller to store a message, password #2 allows the user to access those messages, and password #3 allows the user to change the first two passwords and to clear the unit's memory buffer.

The Signalman Error-Free attaches between the user's system and the modem at both ends of a call, eliminating the need to have extensive error-correction facilities in whatever communications software is being used. The unit automatically detects whether the remote end of the call is compatible with the error-correcting standard used. If it is not, the Signalman Error-Free allows communications to take place without its error control.

The device operates on asynchronous communications

KeepTrack

This utility from The Finot Group allows the user to organize and manage all of the files on a hard disk via a graphics display of the disk's file hierarchy. *KeepTrack* includes a range of utilities for file searching, sorting, monitoring of current and outdated file versions, key file backup, and global file naming. *KeepTrack* also permits the renaming of DOS directories at will.

List Price: \$79

Requires: 128K RAM, hard disk, PC-DOS.

The Finot Group

2390 El Camino Real, #3

Palo Alto, CA 94306

(415) 322-6161

Circle 674 On Reader Service Card

How to Use Framework

FlipTrack Learning Systems, a producer of audio training courses for popular software, has announced *How to Use Framework*, a tutorial for the Ashton-Tate multifunction program. The audio cassette-based course permits the user to learn

The LinTek Cabinet

LinTek Computer Accessories has introduced a steel acoustical printer cabinet sized to fit all but the largest PC printers. The LinTek Cabinet is thickly lined with acoustic foam and features a built-in cooling fan, inside electrical outlet, and a master on/off switch that powers both the enclosed printer and the fan. The cabinet is available with or without a bottom feed opening.

List Price: \$389

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Accessories

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US-ATLAS

This menu-driven geography program includes the names, latitudes and longitudes, and other data for over 32,000 U.S. cities and 1,500 places of interest. The software can find all states with cities of the same name, list all towns within a given radius of a location, and compute great circle distances between cities.

List Price: \$39.95

Requires: 192K RAM, one disk drive, PC-DOS.

Illston PC-Programs

1930 Haystack Dr.

Jefferson City, MO 65101

(314) 635-3417

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Output Files:	
Answer prompts or press CONTROL key plus letter shown:	
<ul style="list-style-type: none"> B Search Options I Input Options O Output Options G General Options F File to Find L Contact List 	<ul style="list-style-type: none"> A Get Advice B Back one Line S Save Definition R Save Entry Q Quit Program E Review Output File

Electra-Find, O'Neill Software

Orchestrator

Control Data Business Centers has released a communications package that ties IBM PCs to Control Data mainframe computers. Called the *Orchestrator*, the micro-mainframe link also has interfaces to popular PC software packages.

Orchestrator consists of a telecommunications program, user security software, backup and restoration utilities, a printer support package, and report backup, restoration, and deletion programs. The menu-driven software provides modem security checks as well as automatic error detection and correction protocols. It requires a 1,200 bits-per-second asynchronous modem with autodial capability.

List Price: \$3,600, or monthly payments of \$150; plus a monthly \$35 maintenance fee

Requires: 320K RAM, two disk drives, PC-DOS 2.x, serial communications adapter, 1,200 bps modem.

Control Data Business Centers, Inc.
500 W. Putnam Ave.
Greenwich, CT 06834
(203) 622-2383
(203) 622-2170

Circle 668 On Reader Service Card

PC Commander

InterPath Corp. has released *PC Commander*, a universal applications interface system for PC-DOS. This software allows the user to access applications software as selections on a menu.

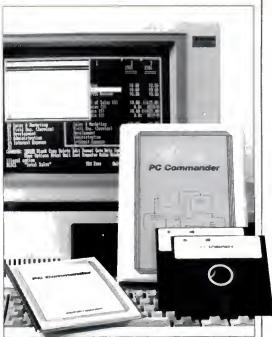
At the heart of the system is a command generator with which the user creates master DOS menus. User-defined menu selections replace the command sequences of the applications programs used.

By following four steps to create the interface menus, the user can forego spending extensive time to learn a new applications program. These four steps are: name the menu; create the commands; define the specific actions each command should generate within the application; and identify the new menu the command should cause to appear on the screen.

The software permits any key, including function keys, to be redefined for each menu level created. *PC Commander* will create menu interfaces to any applications software that runs under PC-DOS, including Lotus's 1-2-3, WordStar, Microsoft's Word, and others.

List Price: \$95

Requires: 256K RAM, one disk drive, PC-DOS 2.x.



PC Commander, InterPath Corp.

InterPath Corp.
3333 Bowers Ave., #253
Santa Clara, CA 95054
(408) 988-3832

Circle 673 On Reader Service Card

WRISTWARE

PC users who also own Seiko's RC-1000 PC Datagraph wrist-watch can now download data from such applications as 1-2-3, dBASE, SideKick, or any ASCII word processing file directly from their systems to their watches. *Wristware* permits the user to load the Seiko watch's 2K RAM with up to 80 screens of PC data. Downloadable data includes scheduled or weekly alarms, world times, phone numbers, and memo files.

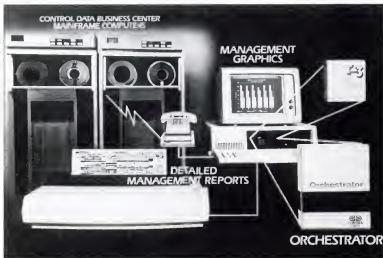
The program formats data automatically for the PC Datagraph's 24-character screen, emulating the small screen on the PC's normal display.

List Price: \$49.95

Requires: 192K RAM, one disk drive, PC-DOS 2.x, serial port, Seiko RC-1000.

Cyberdial Computer Systems
The Cannery
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Wilmington, DE 19805
(302) 652-5102

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Orchestrator, Control Data Business Centers, Inc.

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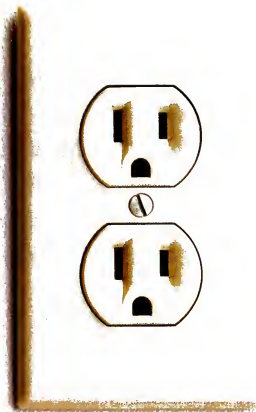
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Experience With Over 1.3 Million Owners				✓

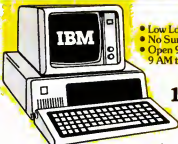
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*Only with WordStar 2000 can correction be done while in editing mode; other programs cited require exiting the program. For a complete comparison chart, write: MicroPro, Dept. 2000, 315 San Pablo Ave., San Rafael, CA 94903. Specifications are for the latest released versions of all products effective April 1985. MultiMate is a trademark of MultiMate Corp.; Microsoft is a registered trademark of Microsoft Corp.; WordStar and MicroPro are trademarks of MicroPro International.

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EDITED BY MARK ZACHMANN



PC Tutor

Do you have a technical question about your PC? PC Tutor answers both elementary and advanced inquiries.

The PC Generation

Q: I have an IBM PC-1 (October 19, 1981) and would like to know what are the differences between it and current PCs, in terms of speed, internal architecture, and compatibility with software and hardware now being developed? Is it time for me to consider upgrading?

Terry J. Brooke
Missoula, Montana

A: There are really only two differences between PC-1s and what we in the press have been accustomed to call PC-2s. (Confusingly, IBM's rumored successor to the PC, probably to be introduced this fall, is also sometimes called the PC-2, but let me stick with the original designation for PCs produced an year after March 18, 1983.) First, PC-2s can use 64K (rather than 16K) RAM chips on the motherboard, so the 2s have a motherboard that goes up to 256K. PC-1s can only expand to 64K on the main board, though you can, of course, install additional memory via plug-in cards. Second, system ROMs for the PC-1 and PC-2 are different. The ROM is used to hold the IBM BIOS, which holds, among other things, the startup and initialization code.

If you stick with the older, original BIOS chip, you will be unable to use more than a total of 512K of memory. You will also be unable to install some hard disks and some other exotic hardware, notably the IBM Enhanced Graphics Adapter and their network adapter. Because of slight differences in the boot-up procedure, any add-on hardware that uses its own ROM to hold programs will probably not be initialized correctly at power on. For example, you won't be able to boot directly from a hard disk but will instead need to use a boot floppy. Finally, your hardware error messages will also be slightly different if

the power-on self-test (called POST) fails.

In terms of software, however, it is unlikely that any program would run on a PC-2 and not on a PC-1.

Personally, I still have a PC-1 (among others) and have no plans to upgrade. The most important upgrade you might consider would be to install the new ROM BIOS chip, and that is only necessary for newer hardware devices.

Unscheduled Interrupt

Q: I wrote a short program that displays the time in the upper-right corner of the screen. The program works well, and the time ticks merrily away, so long as I do not load an .EXE file produced with the BAS-IC compiler. At that point, however, the clock disappears, returning only when the other program is finished. Since my interrupt handler is supposed to stay resident, can you explain what I did wrong?

I tried to load the BASIC program with DEBUG and follow it to see if, by any chance, it modifies the interrupt vector. No luck: DEBUG dies in the middle of the trace. I noticed, though, that DEBUG loads the program at offset 001A, and not at 0100, as the IBM manual says it should. What am I doing wrong?

Roberto Pajno
Milan, Italy

A: First, your timer program uses interrupt ICH (the scheduling interrupt). This interrupt gets called 18.2 times a second, and in your routine the time in hours:minutes is displayed in the upper-right corner of the screen. By constantly writing the time in the corner, you ensure consistent display.

Unfortunately, programs constructed with the BASIC compiler appear to steal that interrupt for their own use. Thus, when you run your .EXE program, your

timer routine does not get its signal to refresh the screen. Once the program clears the screen (probably at startup), the time display will disappear. I'm sorry to say, I don't know of a fix for this problem.

As far as running DEBUG goes, I have often traced the BASIC interpreter. You have to be very careful, however, since BASIC steals so many of the interrupt vectors (as above). In particular, the keyboard may no longer work correctly. (If this happens, the BASIC buffer may be filling up as you type, but DEBUG looks strictly via DOS, which sees no key activity.) Thus, you have no way to type on the system during a BASIC program run.

Perhaps the easiest approach is to let the program run to completion and then examine the variables in the program to see how they ended up. This isn't much good for dynamic debugging. For that, you might try a more sophisticated debugger, which will swap interrupt vectors back in at break points. This would also help for debugging the first problem, since you would expect to see the clock come back on during your debug display (that is, when interrupt 1C is put back).

Finally, as for the entry point being at 001Ah, the DOS manual says that programs are "loaded" at 0100, not that they begin there. In particular, .EXE programs can begin anywhere within the memory. Besides, the CS (code segment) is generally not equal to the PSP, or program segment prefix, which is the actual start of the program.

An Assembler Bug?

Q: I recently purchased a Microsoft MASM Version 3.0 assembler. When I tried to assemble a simple 8-byte program, I got the curious message

Error — 85: End of file, no END directive

This same file compiles fine with MASM Version 1.0. Have you any explanation?

Larry Smith
Göttingen, West Germany

A: Since I recently upgraded to Version 3.0 myself, I understand your problem. Having had some experience with UNIX and C programs, I found the fix to be straightforward.

As far as I can tell, the compiler reads and processes the file a line at a time. Your "last line" must have a carriage return/line-feed pair (in C parlance a "newline" character or "\n") at the end, or that line is never processed. So, I suggest you run your favorite editor and simply put a blank line at the end of each file you compile.

When in Doubt, Read the Manual!

Q: I'm trying to learn about my new IBM XT from the inside out and to that end have acquired several trace programs. Is there any way to trace the boot-up operation of the XT starting at the initial power on? I'd like to do this to learn the different BIOS initialization procedures. This would seem impossible, since even the CRT is not operational until it gets initialized, but perhaps you know of something that will follow the CS:IP addresses during initialization and store them in memory for access later?

Merle A. Smith
Huntington Beach, California

A: While you can carefully trace through the boot operation, I would suggest a simpler and more educational endeavor. Rather than trace through a pile of unassembled listings, I would just read through the BIOS listings supplied with the IBM Technical Reference manual. It contains a complete, commented BIOS source code listing. Having comments as well as mnemonics is easier and more worthwhile than checking a DEBUG list.

If you are intent on tracing through the operation, what you can do is start up the computer and run your debugger. You must use a debugger that will let you set breakpoints equivalent to spots in ROM. Two such debuggers are Codesmith-86 and Periscope. You need to be careful, though, since some of the boot operations will write on your debugger (as the memory gets cleared), destroy the interrupt vectors (as they get set up), and clear out the 8088 registers (during self-test).

Things That Go Bump in the Night

Q: What causes that high-pitched squeal my monitor always makes, and is it fixable by some easy method?

Brett Salter
Atlanta, Georgia

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A: This question brought to mind my recent purchase of several extremely noisy computers. The following is a catalog of the various noises I've encountered, along with diagnostics.

(1) A constant high-pitched monitor squeal. I believe this is caused by the fly-back transformer inside the monitor. That transformer takes the high-frequency information in the video synchronization sig-

nals and generates a high voltage for the monitor. Either loose transformer laminations or loose wires in the transformer coils may be vibrating in time with the sync signals. On a color monitor that would be at 15.750 kHz, which most adults can hear. Replacement of the transformer may cure the problem, but you may get an equally noise-prone replacement.

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A very loud, high-pitched monitor squeal on the IBM monochrome monitor with no picture present is very bad. Your monitor will melt internally.

(2) A very loud high-pitched monitor squeal on the IBM monochrome monitor, with no picture (or a very distorted picture) present. This is very bad. Usually it is caused by connecting the IBM monochrome monitor to a color monitor output. The voltage levels coming out of the fly-back transformer will be all wrong, and your monitor will melt internally within 5 to 10 minutes.

(3) A loud thump when a disk drive is first accessed, usually followed by a softer thump when the drive light goes off. This thump is not harmful. It is caused by the heads settling down on the diskette surface. The earliest IBM drives (made by Tandon) had no thump at all because the heads were always loaded when the drive door was clamped down. Both methods of drive loading (always loaded and loaded when selected) have their proponents. The wear properties of the head should determine which loading method a drive uses.

(4) A musical sound when the computer thinks, at different pitches depending on where you are in the program. I'm not sure what causes this sound. On one of my computers it seems to come from a 512K memory board. On another it seems to emanate from the power supply (or possibly a nearby spot on the motherboard). The memory board has been working fine for 3 years, so apparently the sound isn't fatal. As with various types of monitor squeal, my best guess is a component, either a capacitor or

coil, through which a rapidly changing voltage is passing, producing an electromagnetic field strong enough to induce sympathetic vibration.

(5) A constant shuffling noise when the drive door is closed. This is caused by the diskette being slightly off-center of the sleeve, or by the clamps not coming down squarely in the center. Usually reinforcement rings will prevent this from happening. Remove the floppy and see whether reinserting it carefully stops the noise. Even if you can't stop the shuffling sound, you should still be able to read/write the disk consistently—though I wouldn't entrust it with vital information.

(6) A periodic shuffling from a hard disk when the power is turned on. Hopefully, this is only a loose joint vibrating occasionally. If it's a bearing or, worse yet, one of the heads touching the surface, you're definitely in for a service call. Da-err on the side of caution. I would suggest running the nondestructive fixed disk diagnostics to make sure all of the previously good sectors are still readable. If you have additional bad tracks, send it in for repair immediately after backing up.

(7) A fairly loud humming far between

Bad tracks are nothing but trouble, and continued use without resetting a bad track may cause your files to become mangled.

10 to 30 seconds from the hard disk just before you get a read or write error. This is usually caused by a bad sector/track that was not marked as such. What you are hearing is the drive head performing a number of retries (which it does quickly). The first line of attack is to run CHKDSK/F and see if there is any file damage. If so, correct it and see if the problem reoccurs.

The PC Tutor solves practical problems and explains points of general interest. If you would like to see your questions answered here, drop a line to PC Tutor, PC Magazine, One Park Avenue, New York, NY 10016.

If the problem does reoccur, you must have a bad track. Bad tracks are nothing but trouble, and I would suggest you back up the hard disk, then redo the advanced diagnostics (setting the additional bad

tracks into the bad track table), and finally restore all of your files. Continued use without resetting the bad track table may cause your valuable files to become badly mangled.

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Coming Up

Corporate Communications

PC Magazine focuses on sophisticated communications hardware and software that can put you in close contact with the rest of your company or the rest of the world. Frank Derfler reviews new communications software, including first looks at Microstuf's *Crosstalk Mark IV* and Microsoft's *Access*, two programs that represent a new generation in terms of features and sophistication. Winn Rosch focuses on some common communications problems and the hardware—from port selectors to multiplexers—available to solve them. M. David Stone reviews an eclectic range of software with which you can set up a PC E-Mail system, and Barbara Krasnoff turns a discerning eye toward EasyLink and Echo, two new competitors for MCI Mail.

Special Report: Inside the Well-Designed Office

When you design the space in which your employees spend their day, do you take into account factors such as chair and desk height, lighting, and the number of workers per square foot? Some say that ergonomically designed workspaces increase worker productivity. *PC* gives you a look at several well-designed offices around the country and talks about what makes them work.



R:BASE 5000

The eagerly awaited upgrade to *R:BASE 4000* has finally arrived, and it stands at the cutting edge of the database management systems market. How state-of-the-art can it be? *R:BASE 5000* combines lightning speed, gymnastic flexibility, and loads of sophisticated and innovative features, along with a quick code generator that lets even a novice DBMS user develop complex applications. *PC* offers a thorough analysis of *R:BASE 5000* to uncover its successes and fumbles. But mostly successes.

SuperKey and ProKey

In the lead . . . it's *ProKey*! But wait—coming up on the outside is another winner. . . *SuperKey*! Hold on to your seats, though, because a late entry, *ProKey 4.0*, looks like it has the stuff to become a champion. Who will win the keyboard macro utility sweepstakes? Tune in to *PC Magazine* for complete and accurate coverage of all the action.



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